AMERICAN DYESTUFF REPORTER

"Circulated Everywhere Dyestuffs Are Used"

Published by Howes Publishing Company, 90 William Street, New York

Devoted to the practical application of dyestuffs in all industries; especially to textile chemistry—the science and practice of scouring, bleaching, dyeing and finishing.

Volume XVIII | NEW YORK, JUNE 24, 1929 | Number 11

THE contents of this number consist largely of a report of the Sub-Committee on Light Fastness of the American Association of Textile Chemists and Colorists. Owing to its importance, as well as to its length, it has been thought desirable to publish this notable report complete in the Proceedings of one issue of the REPORTER rather than in two sections, and to accomplish this purpose it has been necessary to make available for Proceedings most of the current issue.

Proceedings of the American Association of Textile Chemists and Colorists

The American Association of Textile Chemists and Colorists

President
E. H. KILLHEFFER
Newport Chemical Works, Passaic, N. J.

Vice-Presidents
WALTER S. WILLIAMS—P. J. WOOD

Secretary
ALEX MORRISON
American Woolen Co., Andover, Mass.

Treasurer
WINTHROP C. DURFEE
516 Atlantic Avenue, Boston, Mass

Councilors
RALPH F. CULVER — GEORGE A. MORAN
B. F. PHETTEPLACE — HUGH CHRISTISON
WILLIAM R. MOORHOUSE — WALTER M. SCOTT

Past President and Chairman of the Research Committee
LOUIS A. OLNEY
Lowell Textile Institute, Lowell, Mass.

LOCAL SECTIONS AND THEIR OFFICERS

Northern New England Section—
William H. Cady, Chairman, Pacific Mills, Lawrence, Mass.
Harold C. Chapin, Secretary, Lowell Textile Institute, Lowell, Mass

Rhode Island Section—
Richard B. Earle, United States Finishing Company, 389 Charles Street, Providence, R. I.
A. Newton Graves, Secretary, Franklin Process Co., Providence, R. I

New York Section—
Daniel P. Knowland, Chairman, Geigy Company, N. Y. City.
Philip H. Stott, Secretary, Newport Chemical Works, Inc., Passaic, N. J.

Philadelphia Section—
A. M. Burt, Chairman, 1046 Public Ledger Building, Philadelphia, Pa.
Percival Theel, Secretary, Philadelphia Textile School Philadelphia, Pa.

Piedmont Section—
Prof. Chas. E. Mullin, Chairman, Clemson College, Clemson, S. C.
Thomas J. Nuckolls, Secretary, Renfrew Plant, Brandon Corporation, Travellers Rest, S. C.

South-Central Section—
L. L. Bamberger, Chairman, 201 College Street, Cedartown, Ga
I. V. Sheffield, Secretary, United States Finishing Company, Cedartown, Ga.

Midwest Section—
Carl E. Bick, Chairman, Real Silk Hosiery Mills, Indianapolis, Ind.
Clarence Wille, Secretary, Burson Knitting Company, Rockford, Ill.

Lowell Textile Junior Section—
A. Kempton Haynes, Chairman; Walter C. Lindsly, Secretary

FOREWORD

ON the following pages the Research Committee of the American Association of Textile Chemists and Colorists presents the third section of the Report of the Sub-Committee on Light Fastness. This section is descriptive of Series IV Light Exposures. The first section, descriptive of Series III Exposures, was published in the Proceedings of the Association in the AMERICAN DYESTUFF REPORTER of November 14, 1927, and the second section, on Series V Exposures, in the Proceedings of June 25, 1928. These three reports constitute most of the work of the sub-committee up to the present time. Other tests are being conducted and further work planned, all of which will be reported at some future time.

The Sub-Committee on Light Fastness has received valuable assistance from the United States Bureau of Standards, and a large portion of the experimental work has been carried out in the Bureau's laboratory. Great credit and also the special thanks of the Association are due to William H. Cady, Chairman of the sub-committee; William D. Appel, Chief of the Textile Division of the Bureau of Standards and member of our Research Committee, and William C. Smith, our Research Associate, for the many hours of painstaking and exhaustive study they have made of the whole subject. We believe that the report of this sub-committee constitutes one of the most complete contributions upon the subject of light fastness of dyes that has as yet been published.

LOUIS A. OLNEY,
Chairman Research Committee.

Proceedings of the American Association of Textile Chemists and Colorists

Report of the Sub-Committee on Light Fastness[1]

3. The Fading of Dyed Textiles in Daylight and in Carbon Arc Light[2]

By WM. H. CADY[3] and WM. D. APPEL[4]

ABSTRACT

TWELVE HUNDRED FIFTY-TWO specially prepared dyeings on cotton, wool, silk, and weighted silk, representing some three hundred eighty-one different coloring matters, were exposed to daylight in several different ways and to the light from a glass-enclosed carbon arc. Each sample was exposed for four different periods of time. In general, slight fading occurred in the first period, decided fading in the fourth, and intermediate amounts of fading in the other two. Seven sets of samples, all cut from the original dyeings, were exposed in the following ways: Sets A and K in the standard sun test of the American Association of Textile Chemists and Colorists, i. e., on clear days between 9 a. m. and 3 p. m. under glass, at an angle of 45 degrees from the horizontal, facing south; Set B, simultaneously with Set A but with no glass cover; Set D, continuously, under glass, in a vertical position, facing south; Set E, continuously, under glass, at an angle of 45 degrees from the horizontal, facing south; Set F, continuously, under glass, in a vertical position, facing north; Set G-H, in the "Fade-Ometer," a type of glass-enclosed carbon arc. The results of a sample-by-sample comparison of the dyeings in the several sets with the corresponding dyeings in Set A taken as the standard are given in the paper. It is shown that:

1. The "standard sun test" (Set A above) of the American Association of Textile Chemists and Colorists gives essentially reproducible results with reference to the relative fading of the dyeings in the series.

2. The presence or absence of a window glass cover over the samples during exposure in the standard test has practically no effect on the fading of 74% of the samples and only a slight effect on 22% of them. It has a marked effect on the fading of the remaining 4% of the samples.

3. Marked divergences in the relative fading of the dyeings in continuous exposures compared with the fading in the standard exposure are noted. These divergences are most marked in the samples exposed continuously, in a vertical position, facing north. A considerable number of the cotton dyeings faded relatively faster than the wool and silk dyeings in this test. In general, the basic dye types, the indigoids, and the ice colors on cotton faded much faster relative to some other cotton, wool, and silk dyeings in the vertical north exposure.

4. Although the majority of the dyeings fade to about the same extent, relative to one another, in the arc exposures compared with the standard sun exposures (1 arc hour = 1.3 hours in the "standard sun test"), fading in the arc light is different in quality from that in sunlight in many instances. Some samples fade entirely too much, others entirely too little, in the arc exposures, but the agreement between standard sun test and arc test is much better than between the former and the continuous exposure in a vertical position facing north.

Miscellaneous observations on the peculiarities in behavior of individual dyeings are recorded.

A classification of the dyeings for fastness to light and a selection of standards of fastness will be given in another report.

CONTENTS

I. Introduction 408
II. Samples 408
III. Method of Exposure 409
1. Mounting and Labeling 409
2. Daylight Exposure Racks 409
3. Standard Sunlight Exposures (Sets A and K) 410
4. Other Daylight Exposures (Sets B, D, E and F) 411
5. Carbon Arc Exposures (Set G-H) 412
IV. Method of Studying Results 413
V. Results of the Daylight Exposures 414
1. Sets A and K, Sunlight Through Glass. 414
2. Set B, Direct Sunlight 414
3. Set E, Continuous, 45 Degrees 414
4. Set F, Continuous, North 415
5. Set D, Continuous, South 416
VI. Results of the Carbon Arc Exposures (Set G-H) 416

[1] The Sub-Committee on Light Fastness of the Research Committee, American Association of Textile Chemists and Colorists.

[2] Publication approved by the Director of the Bureau of Standards, Department of Commerce.

[3] Chairman of the Sub-Committee.

[4] Chemist, Bureau of Standards.

VII. Fastness Classification and Standards of Fastness 416
VIII. Miscellaneous Observations 417
1. "Fading" darker 417
2. Rate of Fading 417
3. Color Change in the Unexposed Area ... 418
4. Reversal When Kept in the Dark 418
5. Fastness of the Same Dye on Different Fibers 419
6. Relation of Color to Fastness 419
7. "Fast" Dyes 419
IX. Acknowledgment 419
X. Tables 420

I. Introduction

DURING 1923, 1924, and 1925, the sub-committee carried on experimental studies directed toward the establishment of a standard method for testing fastness to light. Duplicate sets of dyed materials were exposed to carbon arc light (in the Fade-Ometer), to mercury arc light (in the Uviarc cabinet), and to sunlight. These experiments were repeated again and again at different times by various members of the committee. They were extended in 1925 to include (1) exposures to sunlight made during each of the four seasons, (2) exposures in different parts of the country, (3) simultaneous exposures under glass and without glass, (4) exposures facing to the north, to the south, and vertically upward as well as at an angle of 45 degrees, and (5) exposures to modified incandescent lamp light. The exposures were made so that each set of samples faded on the average approximately the same as the other sets. The divergences in fading were then noted by inter-comparison of the individual samples. The results of this work have already been reported[5]. Since the number of samples studied was limited and some of them were known to behave peculiarly in light exposure tests, it was not considered safe to generalize from the results obtained. The results pointed clearly to the need for a more comprehensive series of exposures.

At a meeting of the sub-committee on December 4, 1925, it was decided to expose a large number of the more widely used dyes on cotton, wool, and silk to daylight under several different conditions, and to carbon arc light. This program, elaborated at subsequent meetings of the sub-committee, has now been carried out.

The present report describes the method of conducting the tests and the results obtained with reference to the fading of the dyeings under the different conditions of exposure. A later report will contain a classification of the fastness of the dyeings and a more complete discussion of standards of fastness.

II. Samples

A total of 1,252 dyeings, including 415 cotton, 441 wool, 370 silk, and 26 weighted silk dyeings, were prepared for these tests[6]. The majority of them were prepared in the spring of 1926 and are hereafter referred to as the "1926 dyeings." Later some "1927 dyeings" were added for reasons to be given. The silk dyes were chosen by Walter M. Scott, the wool dyes by George A. Moran, and the cotton dyes by Wm. H. Cady, each man having the assistance of other members of the committee. In general only dyestuffs which have come into common use and are therefore of general interest were selected. Cotton and silk dyes were applied in two depths of shade, and wool dyes in three. The dyeings were made by eighteen co-operating laboratories on cloth furnished by the committee. A single length of each of the four kinds of cloth was used. The fabrics were: bleached cotton cloth, plain weave, weighing 3 ounces to the yard; half-blood worsted cloth, plain weave, weighing 8 ounces to the yard; "Cinderella" silk cloth, plain weave, unweighted, weighing 1½ ounces to the yard; and silk crepe having a spun silk warp and a gum silk filling, weighing 3 ounces to the yard and containing about 35 to 40% of tin weighting.

The dyeings were assembled by Cady who had them cut into eleven pieces each and forwarded to the Bureau of Standards for mounting and exposure. Thus a total of over 13,000 individual samples were prepared.

Full information concerning the dyeings is given with their serial numbers in Table 2. Numbers 1 to 1047 are the "1926 dyeings." In the spring of 1927, after the exposures had been under way for nearly a year, it was found that a number of important products had been omitted, either accidentally or because they were only recently on the market. Furthermore, it was considered desirable to make a careful examination of the dyes recommended as standards of light fastness by the German Fastness Commission and by several British research associations, to determine whether they would be suitable for adoption as standards in this country. It seemed desirable also to make a comparison of exposures on weighted and unweighted silk, in order to ascertain whether separate standards would be necessary for these two types of textiles. These additional dyeings, here-

[5] Cady and Appel, "Report of the Sub-Committee on Light Fastness: 1. Light Exposures, Series 3." American Dyestuff Reporter **16**, 707-715, November 14, 1927.

[6] The Lithographic Technical Foundation, Inc., in co-operation with the Bureau of Standards, exposed 136 lithographic prints, representing 31 pigment and lake colors, simultaneously with the dyed samples. A report on the inks by Appel and Reed, "The Light-Fastness of Lithographic Ink Pigments," will be published in the Bureau of Standards Journal of Research for 1929.

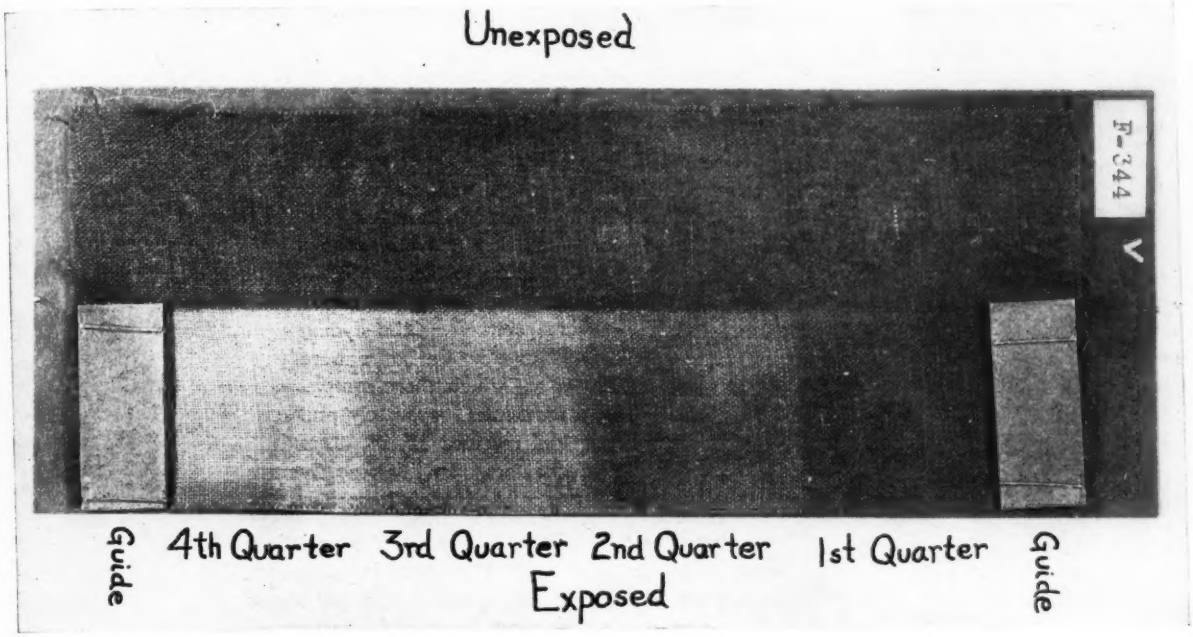


FIG. 1—*A Sample (After Exposure) Showing the Method of Mounting and the Four Exposed Areas*

after to be designated the "1927 dyeings," are numbered 1301 to 1508 in Table 2.

Tables 3 and 4 are indices to Table 2. Table 3 lists in numerical order the dyes for which Colour Index[7] numbers are known. Table 4 lists all other dyes in alphabetical order. Table 5 gives the dyeing methods used in preparing the samples, and Table 6 the chemical types of dyes represented. The distribution of the samples among the different chemical and dyeing classes may be of interest and is given in Table 7.

III. Method of Exposure

1. Mounting and Labeling.

All daylight exposures were made on samples measuring 2¼ by 6 inches and all carbon arc exposures were made on samples 2¼ by 3 inches. They were mounted with wire staples on heavy opaque black paper and labeled as shown in Fig. 1. Eleven complete sets of samples were thus prepared. Each set was designated by a letter[8], and each member of a set was given a serial number corresponding to the dyeing from which the sample was cut.

[7] Colour Index of the Society of Dyers and Colourists, Bradford, England, 1924. Also Supplement to the Colour Index, 1928.

[8] Sets I and J are being reserved for future work. The exposure of Set C was not completed.

The individual samples of each set of daylight exposures were assembled in numerical order, twenty-five in a row, beginning at the right, and attached to one another with wire staples along the bottom so that each sample overlapped the left-hand half of the preceding sample. In this manner the opaque backing of Sample A2 masked the left hand half of Sample A1, etc. The cardboard chips on the upper and lower right-hand corners of each sample (Fig. 1) served as guides so that the degree of fading could be examined at any time and the covering sample replaced exactly in its original position. The samples thus mounted were fastened to 20-inch by 33-inch boards with thumb tacks, each board holding three rows of twenty-five samples each. This arrangement is shown in Fig. 2.

The samples were exposed to the carbon arc in the special holders furnished with the lamp used (the Fade-Ometer).

2. Daylight Exposure Racks.

The exposure racks are located on the roof of the Industrial Building, Bureau of Standards, Washington, D. C., as shown in Figs. 3 and 4. The racks run east and west and are open to the full light of the sky. The boards holding the samples were placed in the racks as shown in Fig. 4.

The glass covers used in some of the tests were set at

a distance of one-half inch from the samples and provision was made for free access of air to the samples. The covers were five inches larger in each direction than the boards supporting the samples, so that there was no significant shading by the framework of the cover. This was verified by exposure of duplicate samples in diagonally opposite corners and in the center of an exposure board. Ordinary window glass was used. It was purchased under a specification which required selection for uniformity in color, thickness, and composition. By actual measurement the minimum and maximum thicknesses of the pieces used were 0.112 and 0.139 inch, respectively, and the average thickness 0.125 inch. The spectral transmission of two pieces of the glass taken at random is shown in Fig. 5. The glass covers were cleaned frequently.

3. Standard Sunlight Exposures (Sets A and K).

The previously proposed "standard" sun exposure test was adopted as the standard for this work. The conditions of this test follow: "Samples are exposed at an angle of 45 degrees from the horizontal facing south, between 9 a. m. and 3 p. m. on sunny days only, in a cabinet covered with a good grade of window glass approximately one-eighth of an inch thick and open at the sides in such a way as to allow free access of air to the samples. The distance between the samples and the glass should be not less than one-half inch."[9]

Set A was exposed in this way starting on June 18, 1926. After six hours, samples which showed a change in color were remounted separately and labeled Group 1. Then the upper fourth of the exposed portions of these dyeings was covered with opaque black cardboard and a further six-hour exposure was given. The cardboard was then moved so as to cover the second quarter in addition to the first. This was continued until the quarters had been given exposures of 6, 12, 24, and 48 hours, respectively. The dyeings which did not show a color change in six hours were exposed for six hours longer, after which those samples showing a color change were remounted separately and exposed, as above, until they had received 12, 24, 48 and 96 hours on their respective quarters. In this way five groups of samples were distinguished, as follows:

Group 1, exposed for periods of 6, 12, 24 and 48 hours.
Group 2, exposed for periods of 12, 24, 48 and 96 hours.
Group 3, exposed for periods of 24, 48, 96 and 192 hours.
Group 4, exposed for periods of 48, 96, 192 and 384 hours.
Group 5, exposed for periods of 96, 192, 384 and 768 hrs.

The idea was to have each sample just barely faded

[9] American Dyestuff Reporter **16**, 707; also **14**, 853.

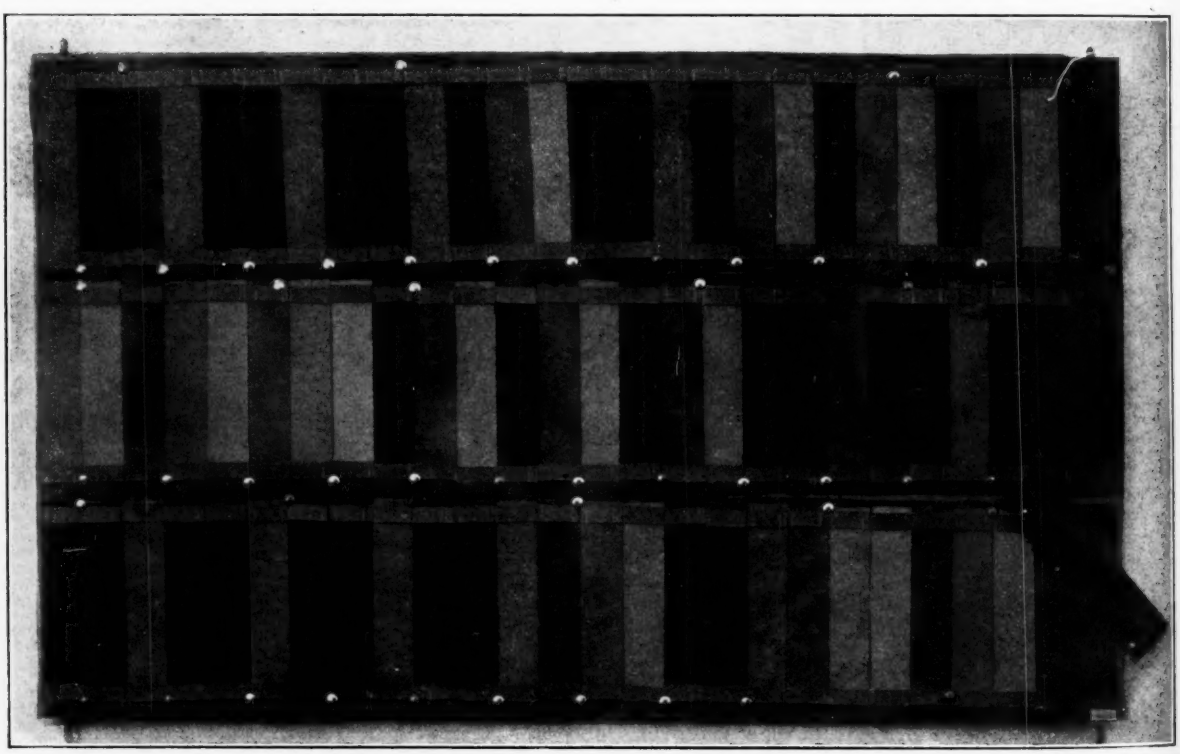


FIG. 2—*Samples Mounted on Board Ready for Exposure*

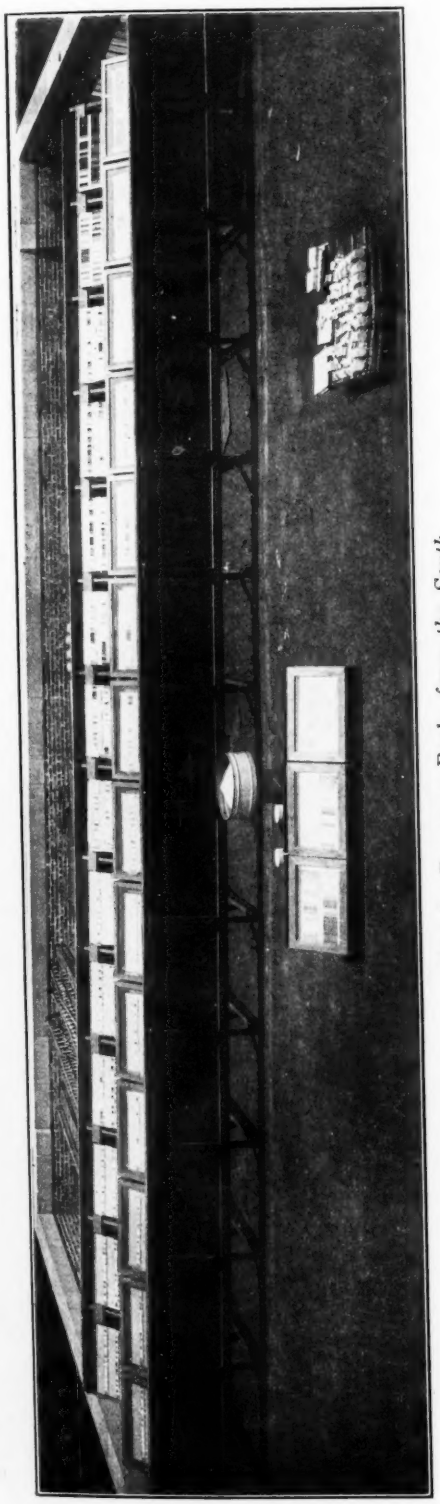


FIG. 3—*Exposure Racks from the South*

in the first exposure period and badly faded in the fourth with two distinct steps in between. The grouping was necessary because of the differences in fastness of the individual samples. This grouping was used for all other sets regardless of how the samples faded in those sets; that is, the Group 1 samples in Set A were the Group 1 samples in Sets K, B, F, etc.

Set K was exposed for the same time, group by group and quarter by quarter, as Set A, but it was started a year later in order to find out how well results obtained in the "standard" exposure could be duplicated.

4. Other Daylight Exposures (Sets B, D, E, and F).

The conditions under which the seven types of daylight exposures were made may now be listed for ready reference:

Set A—Exposed only on clear days between 9 a. m. and 3 p. m.; under glass, at an angle of 45 degrees from the horizontal, facing south. When clouds came up, the samples were promptly covered.

Set B—Simultaneously with Set A and under the same conditions except that no glass cover was used over the samples.

Set C—Like Set A but in a vertical position facing north. Because, in this position, exposure required excessive time, this set was not carried through to completion and will not be discussed in this report.

Set D—Exposed continuously day and night, regardless of the weather, under glass, vertical, facing south.

Set E—Exposed continuously, under glass, at an angle of 45 degrees, facing south.

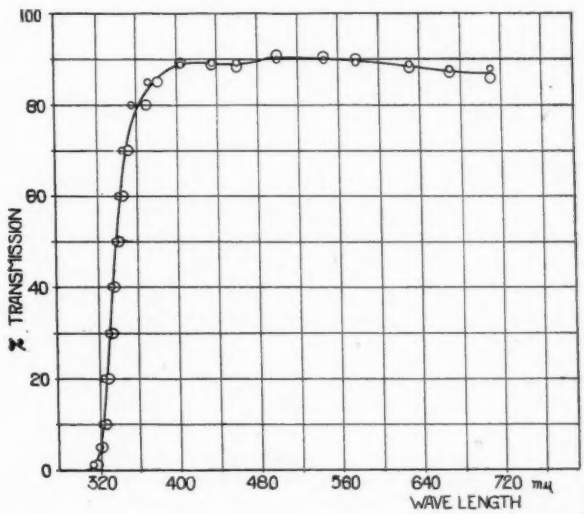


FIG. 5—*Spectral Transmission of the Glass Used*

Set F—Exposed continuously under glass, vertical, facing north.

Set K—Like Set A but starting in June, 1927, the Set A exposures having been started in June, 1926. The 1926 samples only, numbers 1 to 1047, were exposed in this set.

Set B was exposed for the same time, group by group and quarter by quarter, as Set A and simultaneously with it.

Sets D, E, and F were exposed so as to obtain, as nearly as could be judged by rapid inspection, the same average fading as that obtained in Set A. The object of this procedure was to determine approximately the fading time of each of the several sets relative to Set A, and the effect of different conditions of exposure on the fading of individual dyeings.

A detailed record of the time of exposure of the different sets is given in Tables 8 to 13. These tables also contain data on the temperature and humidity during the exposures. No record was made of the amount of light reaching the samples under the several conditions, since it had previously been shown that the amount of fading could not satisfactorily be correlated with this quantity as measured by the barium photoelectric cell.[10] A comparison of temperatures taken with a plain mercury thermometer and with a thermometer having the bulb covered with black paper is shown in Fig. 6. Dyed samples may reach a temperature 10 degrees higher than that given by a plain mercury thermometer.

5. Carbon Arc Exposures (Set G-H).

The commercially available carbon arc lamp known as

[10] Appel, "Report on Experiments with the Photoelectric Cell in Relation to Testing Fastness to Light of Dyed Materials." American Dyestuff Reporter **16**, 715-719, November 14, 1927.

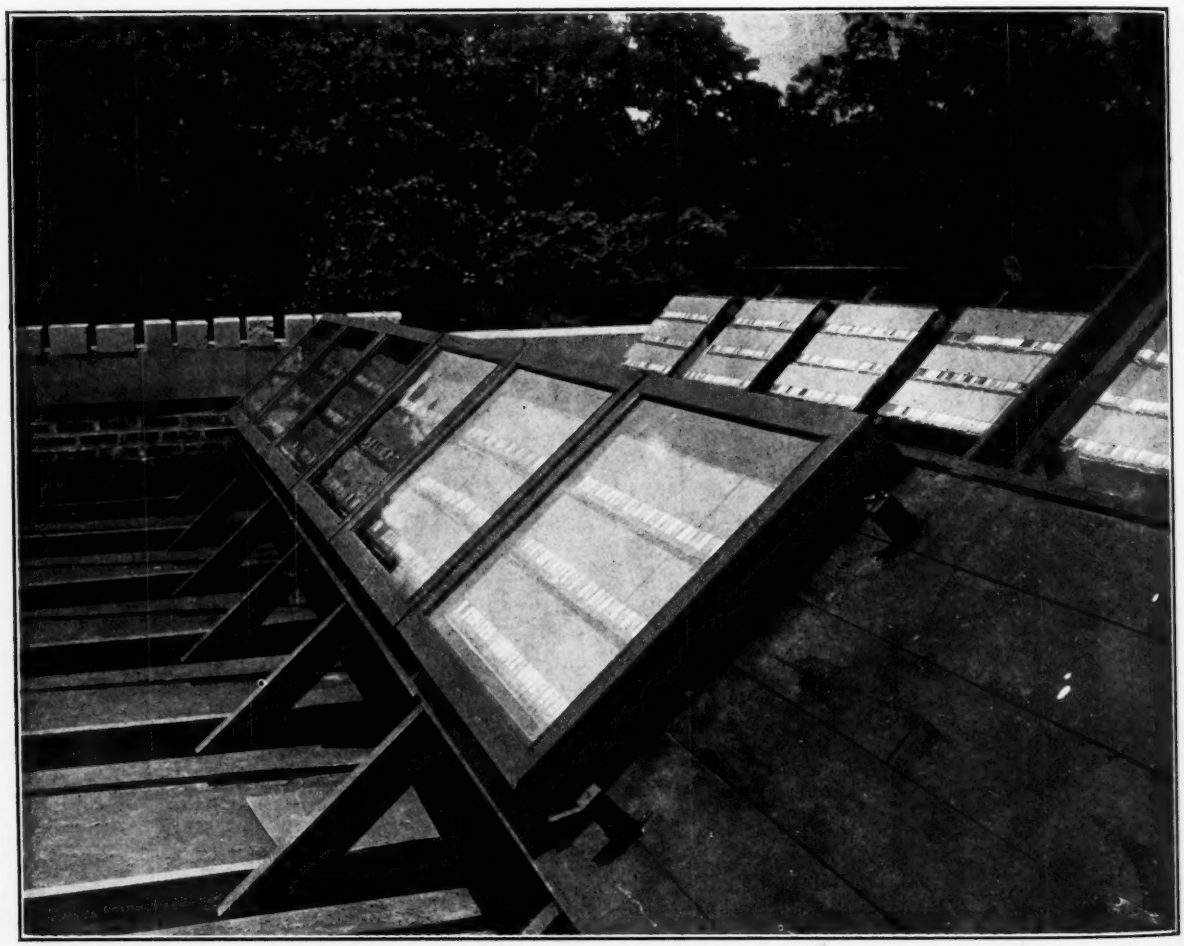


FIG. 4—*One of the Exposure Racks; Near View*

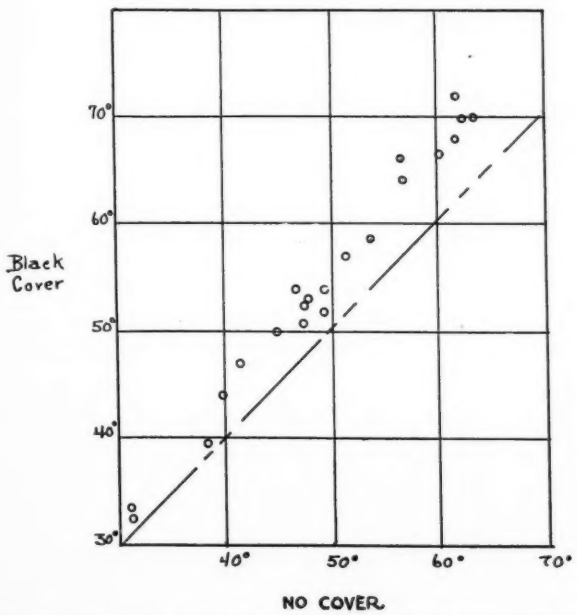


FIG. 6—*Temperatures Taken with a Plain Mercury Thermometer and with a Thermometer Having the Bulb Covered with Black Paper — Observed During the Set A, Under Glass, Exposures*

the Fade-Ometer,[11] which is especially designed for fading tests, was used because it runs for over twenty-four hours without attention and because it is in rather general use in industrial laboratories.[12] It is a glass-enclosed arc giving little or no radiation below a wave-length of 320 mμ but much between 350 and 480 mμ. Its spectral distribution in comparison with sunlight is given in Table 1. The solid carbons furnished with the lamp were used. The lamp was operated on a 230-240 volt DC circuit at 12-13 amperes. The samples were placed in the holders provided and were thus exposed at a distance of 10 inches from the axis of the arc.

Set G-H, which was identical with those previously described, except that the samples measured 2¼ by 3 inches, was exposed in the Fade-Ometer, each sample for two different periods of time. The G samples were given an exposure corresponding to the first and second quarters of the Set A sun exposures, and the H samples were given exposures corresponding to the third and fourth quarters of Set A. A piece of thin sheet aluminum was used to shield one-half of the sample, while the other half was receiving its full exposure.

According to the manufacturer, exposure for one hour in the Fade-Ometer is equivalent to 1.3 hours of summer sunlight for textiles. Thus 4 2/3 arc hours should correspond to our unit of six hours of summer sun between 9 a. m. and 3 p. m. (Set A). On the average this was found to be true and the arc exposures were timed accordingly, as indicated in Table 13.

It is interesting to observe, in passing, that on the average lithographic prints faded as much in 2 1/3 hours exposure to the arc as in six hours exposure to the sun (Set A).[6] In other words, a lithographic print which fades at the same rate as a dyeing in the sun exposure will fade twice as fast as the dyeing in the arc exposure.

In carrying out the arc exposures, repeated interruptions were avoided as far as possible. Each sample was exposed for approximately half the time in the upper row of openings and the other half of the time in the lower row, since it is claimed that somewhat more fading is produced in the upper row than in the lower in a given length of time.[13] The receptacle below the lamp was supplied with water at all times and the globes were cleaned daily.

The maximum temperature given by a mercury thermometer, the bulb of which was covered with black paper and placed near the samples during exposure to the arc, was found to be 80° C. Without the covering of black paper the maximum observed temperature was 70° C.

IV. Method of Studying Results

The usual method of evaluation by visual comparison of samples was used in studying the fading obtained. Each sample was compared with the corresponding Set A sample as standard. The comparisons were made by Appel and Welch[14] working together in 1926 and 1927 and by Appel and Smith[14] in 1928. They were made without reference to the particular dye under consideration. A second comparison made independently of the

[11] Two new Fade-Ometers (as manufactured in 1926) were very kindly placed at our disposal for this work by the Atlas Electric Devices Company, of Chicago. It has previously been shown by the committee that Fade-Ometers in different mills may produce different amounts of fading in a given time. The two used by us were found to take practically the same current, as shown by a recording ammeter, and they were probably interchangeable, since the environmental conditions were very similar. No difficulties were experienced in the operation of the machines.

[12] Since this work was started a lamp known as the Fugitometer has been developed by the British Research Association for the Woolen and Worsted Industries. We understand that it differs from the Fade-Ometer in having a means for controlling the humidity and temperature of the air about the samples while they are being exposed. Auxiliary equipment for ventilating the Fade-Ometer and raising the humidity of the air about the samples being exposed in it is now obtainable from the Atlas Electric Devices Company.

[13] Gordon, "Testing Fastness of Dyed Colors to Light." American Dyestuff Reporter **14**, 488 (1925).

[14] Isabel M. Welch was formerly assistant chemist at the Bureau of Standards. William C. Smith is research associate at the Bureau of Standards from the A. A. T. C. and C. See acknowledgment.

first served as a check. Later, the comparisons were reviewed in some detail by Cady and in a more general way by other members of the sub-committee.

In making the comparisons, the point of view of practical use was always uppermost in mind. Two dyeings were considered to be faded to the same extent even if one darkened and the other became paler, provided the color change was noticeable and objectionable to the same extent. The behavior in all four periods of exposure was considered and judgment was based on the whole. However, the shorter periods of exposure often showed little fading and in such cases the attention was focused more particularly on the longer exposures. Not infrequently the comparison was made difficult by peculiarities in behavior under the different conditions of exposure. Notwithstanding the difficulties, it is believed the final results are substantially correct and that the personal factor has been minimized.

Each sample was rated in the comparison as having faded "less," "slightly less," "equal," "slightly more," or "more" than the corresponding sample in Set A. The "slightly more" and "slightly less" categories are significant chiefly in showing the general trend of the fading. The "less" and "more" categories contain samples which show a decided divergence from the Set A sample and therefore require special consideration. These comparisons are recorded in Table 2.

Peculiarities in behavior under different conditions of exposure may be associated with the fiber, or with the dyeing class, chemical class, or color of the dyestuff. A statistical study of the results to detect such correlation is justified by the large number of samples used, and such a study has been made. (See under "Miscellaneous Observations.")

V. Results of the Daylight Exposures

1. Sets A and K, Sunlight Through Glass.

Set A was used as the standard of comparison for all other sets because it was exposed in the "standard" test of the sub-committee. This test had been found to give essentially reproducible results in the earlier experiments and has done so in the present work. Thus Set K, which was exposed a year later than Set A but in the same way and for the same periods of time, was compared sample by sample with Set A with the following results: Over 95 per cent of the 1,043 samples faded to the same extent in the two sets; 0.3 per cent faded "less," 3.6 per cent "slightly less," and 0.6 per cent "slightly more," in Set K.

Results of the sample-by-sample comparison of this and other sets with A are given in Table 2 and are summarized in Table 14.

2. Set B, Direct Sunlight.

Set B is strictly comparable with Set A, having been exposed simultaneously with it. Set B differs from Set A in that no glass cover was placed over the samples. Thus Set B received the ultra-violet radiation which was absorbed by the glass over Set A, and in addition a certain amount of light which the glass reflected and which thus did not reach the Set A samples. Two other differences between Set A and Set B exposures should be noted. In general, the temperature was lower and the atmospheric humidity higher in the Set B exposures. (See Table 8.)

The general agreement in the fading of Set B compared with Set A is good, as shown in Table 14. Seventy-four per cent of the B samples match the A samples very closely; 7.3% of the samples have faded "slightly less," and 14.4% "slightly more" in Set B. It is not surprising to find that 3% faded decidedly "more" in Set B than in Set A and to note a trend toward greater fading in Set B than in Set A. This trend is not sufficiently marked, when all of the dyeings are considered, to support those who would attribute great effectiveness in producing fading to the short wave-length ultra-violet in sunlight which does not pass through window glass. It is to be noted, however (Table 14), that the 208 "1927 dyeings" show a greater tendency toward more fading in Set B than in Set A, than the 1,044 "1926 dyeings" show. They are probably less representative than the larger group.

One and three-tenths per cent of the B samples, sixteen in all, faded decidedly "less" than the corresponding samples in Set A. This was not to be expected, and must be accounted for by the difference in temperature and humidity of the two sets of exposures. Dyes which have behaved in this way are: Hematine and Quinoline Yellow, on wool; Quinoline Yellow, Helindone Orange R Powder, Safranine A Conc., Methylene Blue 2B, Victoria Blue BX, Eosine Y, Erythrosine B, and Phosphine G, on silk. None of the cotton dyeings faded "less" in Set B than in Set A. A further study of some of these dyeings has been published.[15]

3. Set E, Continuous, 45 degrees.

Set E was exposed in the same frames used for Set A but was out continuously, that is, day and night, and regardless of the weather. Thus, in addition to the intense sunlight of clear days, it received the diffused light of cloudy days and the subdued light of morning and evening. The temperature during the E exposures showed essentially the same range as that during the A

[15] Appel and Smith, "Report of the Sub-Committee on Light Fastness: 2. The Fading of Dyed Textiles in the Light Transmitted by Various Glasses." American Dyestuff Reporter 17, 410-422 (1928).

exposures, but much of the time it was lower. The relative humidity was much higher on the average during the E exposures, the air being practically saturated at times, though on bright hot days it was quite as dry as during the A exposures. Tables 8 and 11 should be consulted for the dates of exposure of Sets A and E.

In comparing E with A it must be remembered that the exposure of each quarter of the E samples was ended when, in the judgment of the observer, the average fading of the whole group of samples was equal to that of the corresponding A samples. That he was reasonably successful in properly timing the exposures is shown by the summary of comparisons given in Table 14.

Of the 1,252 samples, 64.2% faded to the same extent in Set E as in Set A. The rest are distributed as follows: 1.8% "less," 20.7% "slightly less," 7.1% "slightly more," and 6.2% "more" in Set E. The variation from Set A shown by Set E is about the same as that of Set B, but a slightly larger number of samples are found in the "less" and "more" categories. Inspection of Table 2 reveals that a rather larger number of the cotton dyeings have faded more than the average in Set E, and that the wool and silk dyeings have faded somewhat less than the average.

Seventy-eight samples of Set E have faded more than the Set A samples. Of these, 71 are cotton, five are wool, one is silk, and one weighted silk. If this accelerated fading is to be attributed to the higher humidity or to the selective action of low intensity light, then the corresponding samples in Set F should be faded more than those in Set A. This is found to be true with only five exceptions. Similarly, since Fade-Ometer exposures are characterized by low atmospheric humidity and high light intensity, the corresponding samples in Set G-H should not fade more than in Set A. Sixteen exceptions are to be noted. Of these, nine are ice colors on cotton, and one is indigo on wool, which may sublime at the high temperature in the Fade-Ometer.[16]

Twenty-three Set E samples have faded "less" than the Set A samples. Only one of these is cotton, eleven are wool and eleven are silk. Dyeings which fade "less" in Set E might be expected also to fade "less" in Set F and "equal" or "more" in Set G-H. Nine exceptions in the first class and one in the second are noted among the samples referred to above.

Thus the Set E exposure data may be taken to show that a good many cotton dyeings fade at a different rate in continuous exposures than in the standard (intermittent) sun exposure in comparison with some other cotton dyeings, and more particularly in comparison with wool and silk dyeings. This is brought out more clearly in Sets D and F to be discussed.

[16] Hibbert, "Notes on the Effect of Light on Colored Fabric, II." J. Soc. Dyers and Colourists **44**, 10 (1928).

4. Set F, Continuous, North.

Sets A, B, and E are very similar in their fading; Sets D and F show marked differences from them. Sets D and F are of special interest because they were exposed very much like curtains in south and north windows, respectively, and because the fastness to light tests proposed as standard in Germany and in England are similar to Set D exposures. Set F will be discussed next because it presents the greatest contrast to Sets A, B, and E.

Set F was exposed continuously, in a vertical position, behind glass, facing north. Thus it received light of relatively low intensity. It is a well known fact that the spectral distribution of skylight is different from direct sunlight.[15]. The temperature of this exposure was low and the humidity relatively high, as shown in Table 12 which also gives the exposure data.

The timing of these exposures was extremely difficult because some of the dyeings faded too much and others too little as judged by comparison with Set A. The results obtained, which are shown statistically in Table 15, bring out this behavior clearly. Thus in the column of totals, the 1,252 samples are distributed as follows: "Less" than Set A, 399 samples; "slightly less," 263; "equal," 376; "slightly more," 73; "more," 141. An examination of Table 15 shows that nearly half of the cotton dyeings have faded too much and that the large majority of the wool and silk samples have faded too little, relatively. Thus a very clear cut difference in behavior between the cotton dyeings and the wool and silk dyeings is shown. It is quite true, however, that some of the cotton dyeings have behaved like the wool dyeings and a few of the wool and silk dyeings have behaved like the cotton dyeings. The differences in behavior just referred to are not marked in Group 1 and Group 2 exposures. Group 3 was split into two parts, 3A and 3B in the tables, and the first part was exposed for a shorter time than the second. Thus a better distribution of the wool and silk samples in the five categories was obtained, but it can be seen (Table 15) that some of the samples are overexposed and others underexposed relative to Set A.

The ten wool dyeings and the five silk dyeings which have faded "more" than the corresponding Set A dyeings are especially interesting since they have behaved markedly different from the other dyeings on the same fiber. A list of them follows:

199 Diazine Black V on silk.
370 Pontacyl Fast Black BBO on silk.
864 Eosine Y on silk.
866-867 Erythrosine B on silk.
430 Ethonic Fast Fuchsine 2B on wool.
589-591 Superchrome Yellow GN on wool.

592 Diamond Flavine GA on wool.
610 Autochrome Green BB on wool.
795 Erio Chrome Flavine A conc. on wool.
804 Erio Chrome Cyanine RC on wool.
1329-1330 Indigosol O on wool.

Five samples, namely, 201 Direct Pure Yellow M, 485 Thioflavine S, 868-9 Phosphine G conc, and 874 Acid Magenta Cryst, were originally placed in this list because they faded darker and duller in Set F than in Set A. On long standing in the dark, the faded area of these samples has mellowed down to such an extent that they are finally classified as equal to or only slightly more faded than the Set A samples.

The extent of the divergence in relative fading of certain samples in Set F from that of the corresponding samples in Set A, is shown by the data given in Tables 16 and 17. Although some samples faded as much in three days under Set F exposure conditions as in 48 hours under Set A conditions, other samples required eleven days and others sixty-one days in Set F to fade to the same extent as when exposed for forty-eight hours in Set A. Some samples required eleven, others forty-one and still others 160 days exposure in Set F to fade to the same extent as in ninety-six hours exposure in Set A.

The data obtained from Set F may be further analyzed by tabulating according to dyeing method and chemical class. This has been done only for the cotton samples. The tables are not given here but it is evident that the basic dye types, the triphenylmethane, xanthene, thiazol, azine, and thiazine dyes applied on a tannin mordant, have faded relatively more in Set F than in Set A. The vat dyes, particularly the indigoids, show a marked tendency to fade more, relatively, under the Set F conditions. Sulphur dyes do not show this tendency and direct azo dyes, including as they do a variety of chemical types, show a diversified behavior. The coupled "ice colors," however, show a marked tendency to fade relatively more in Set F.

The wool and silk samples in Set F do not appear to show any marked peculiarities in behavior that can be definitely associated with the chemical class or dyeing method.

5. Set D, Continuous, South.

Set D was exposed continuously in a vertical position behind glass facing south. Thus it received sunlight at an acute angle on clear days and skylight at all times. The temperature and humidity was intermediate between those recorded for sets E and F. Essential data are given in Table 10.

Set D received light of lower intensity than Set E, but at times light of higher intensity than Set F. Perhaps the results may best be described as intermediate between those obtained from Sets E and F. This is true as to the time required to produce equal fading and as to the nature of the fading, though in general the D samples are more nearly like the F samples. It is not thought necessary to go further than to give the distribution of the samples in the comparison with Set A. Nine and three-tenths per cent were "less" faded in Set D than in Set A, 24.9% "slightly less," 47.6% "equal," 8.1% "slightly more," and 10.1% "more." Only 90 of the 1,252 samples, or 7.2%, behaved markedly different in Set D from their behavior in Set F. Examination of Table 2 will confirm this statement and show the general similarity in behavior between the sets.

VI. Results of the Carbon Arc Exposures (Set G-H)

It has already been stated that Set G-H was exposed in the Fade-Ometer, a type of the carbon arc light, according to the schedule given in Table 13. For textiles, 4 2/3 Fade-Ometer hours were taken to be equivalent to six sun hours (Set A), and this ratio proved satisfactory in the tests. The sample by sample comparison of sun-through-glass (Set A) with carbon-arc (Set G-H) exposures shows in general rather good agreement in the amount of fading. The fading of the G-H samples is in many instances distinctly different in quality from that of the A samples, so that it cannot be said they reproduced the appearance of the sun exposures. However, it is expected that the arc exposures will lead to approximately the same fastness classification as the sun exposures in the majority of cases. This will be discussed in another report. The arc exposures more nearly match the Set A and Set B sun exposures than they do other daylight exposures and they are less divergent from them than the Set F exposures. It is probable that other types of daylight exposures could be approximated by modifying the temperature, humidity, and light intensity of the arc exposures.

VII. Fastness Classification and Standards of Fastness

One of the very practical and important results of this work will be a classification of the fastness of the 1,252 dyeings on the basis of tests which have been carried out *at one time*. The divergence in classification resulting from the different conditions of exposure will also be shown. Although much of this work has already been done, it is reserved for publication in a later report in order to incorporate with it a discussion of standards of fastness.

Advantage has been taken of this work to study the standards proposed by the German Fastness Commis-

sion,[17] by the British Research Association for the Woolen and Worsted Industries,[18] and by the British Silk Research Association.[19] Some of these standards did not fade as anticipated and further work has been necessary in order to find a series of dyeings suitable for standards under American conditions. This does not necessarily imply that the European standards are unsatisfactory, but merely that the dyeings made from these standards in an American laboratory and exposed in this country gave results different from those obtained abroad from dyeings made abroad. It will be remembered that the European method of test is to expose continuously in a vertical position facing south. This test is reproduced in the Set D exposures, though the latitude of Washington is far south of that of England and Germany.

Standards are being chosen as far as possible from those already in use in Europe. The requisites for a standard are considered to be as follows: (1) It must show a different amount of fading for each period of exposure, the differences being clear-cut and easily distinguished. (2) It must show approximately the same relative degree of fading in Sets A, B, E, and G-H, that is, with and without glass, continuous or intermittent exposure in sunlight, or in the carbon arc. (3) It must be a well-known dye of definite composition applied by a simple method, and easily duplicated, and the dyeings must not change in color when stored. The committee is trying to provide dyeings to meet these requirements at the present time.

VIII. Miscellaneous Observations

1. "Fading" Darker.

A considerable number of dyeings have become darker instead of lighter in these tests. This behavior seems to be especially pronounced in strong dyeings of triphenylmethane dyes. For example, the 5% dyeing of Patent Blue A (No. 649, Table 2) has become darker in each exposure period until in the fourth period, forty-eight hours, it has become almost jet black. The weak dyeing of this dye (No. 651, 0.2%) has faded lighter and lighter. A 1% dyeing (No. 650) has darkened slightly in the first three exposure periods, but in the fourth it is obviously becoming lighter.

"Fading" darker is not limited to triphenylmethane dyes nor to any one fiber or color. Some dyeings "fade" darker during exposure to the north, Set F, as well as during exposure under Set A conditions. Others have faded darker in A, but not in F. A list of some of the samples which have faded darker in one or more sets follows:

Samples Which "Fade" Darker

152	2.0%	Pontamine Light Yellow 5 GX on cotton.
156	2.0%	Pontamine Yellow SX on cotton.
176	2.0%	Direct Fast Yellow NN on cotton.
214	2.0%	Fast Acid Green B on silk.
215	2.0%	Alphazurine 2G on silk.
219	2.0%	Alphazurine A on silk.
259	2.0%	Azo Yellow A 5W on silk.
260	0.5%	Azo Yellow A 5W on silk.
291	4.0%	Sulphur Yellow 2G on cotton.
293	4.0%	Sulphogene Yellow GA on cotton.
307	20.0%	Indanthrene Gold Orange 3G paste on cotton.
309	20.0%	Anthra Yellow GC paste on cotton.
381	2.0%	Metanil Yellow conc. on silk.
391	2.0%	Alizarine Astrol B on silk.
409	2.0%	Kiton Pure Blue V on silk.
430	5.0%	Ethonic Fast Fuchsine 2B on wool.
435	5.0%	Metanil Yellow 1955 on wool.
441	5.0%	Erio Green Extra on wool.
450	5.0%	Wool Green BSNA on wool.
465	5.0%	Violamine DSA on wool.
466	1.0%	Violamine DSA on wool.
601	5.0%	Pontacyl Fast Violet 10B on wool.
628	5.0%	Acid Violet 4BX on wool.
643	5.0%	Acid Yellow 1029 on wool.
649	5.0%	Patent Blue A on wool.
754	3.5%	Victoria Blue B on wool.
763	5.0%	Brilliant Milling Blue B on wool.
769	5.0%	Kiton Pure Blue V on wool.
775	5.0%	Brilliant Milling Green 6B on wool.
778	5.0%	Guinea Green on wool.
817	3.0%	Alizarine Astrol B on wool.
824	5.0%	Indanthrene Yellow GK pdr. on silk.
860	1.0%	Victoria Blue BX on silk.
869	2.0%	Phosphine G conc. on silk.
875	2.0%	Acid Magenta Cryst. on silk.
955	20.0%	Ponsol Green BN paste on cotton.
974	5.0%	Ponsol Yellow G dbl. paste on cotton.
975	1.25%	Ponsol Yellow G dbl. paste on cotton.
979	10.0%	Ponsol Gold Orange G dbl. paste on cotton.
1318	5.0%	Alizarine Supra Blue R on wool.
1332		Paranitraniline Red on cotton.
1389	1.0%	Azo Yellow A5W on wool.
1390	2.0%	Azo Yellow A5W on wool.
1391	5.0%	Azo Yellow A5W on wool.

2. Rate of Fading.

The classification of a dyeing for fastness depends on how soon it starts to fade and how badly it fades in a given time. It is customary to test comparative fastness

[17] American Dyestuff Reporter **16**, 613, 641, 673 (1927).

[18] Journal Society of Dyers and Colourists **41**, 347 (1925).

[19] Laboratory Report No. 21, British Silk Research Laboratory, University of Leeds, July, 1925; also Journal Society of Dyers and Colourists **42**, 301 (1926).

by making a single exposure. A dyeing which shows less fading is said to be faster than one which shows more fading in this test. A considerable number of vat-dyed silk samples show distinct alteration in color during a short exposure, but do not fade very much more during longer exposures. This is true of some cotton and wool dyeings also. If a dyeing which behaved in this way were tested in the single exposure test referred to above its "fastness" would depend upon the duration of exposure, provided the standard used faded in uniform steps. A study of the rate of fading of a few samples by measurement of their spectral reflection is contemplated.

3. Color Changes in the Unexposed Area.

At least one-tenth of the samples showed distinct color changes in the unexposed area during one or more of the tests. In the majority of cases these changes were temporary, the original colors returning after the samples were kept in the laboratory for a few days. These temporary color changes were probably produced by the drying out of the samples on a hot day or by an increase in the moisture in the fibers on damp days.

About forty-five samples show color changes in the unexposed area which may be permanent. Usually these took place in the Set A exposures, the E exposures showing it to a somewhat less degree and the other sets still less or not at all. However, in some instances, the opposite behavior was observed. Dyeings of Ponsol Violet RRD paste on cotton, for example, became much redder in Set F, but did not change in Set A. Laboratory tests have shown that the drying out of the samples in Set A, or the increase in moisture content of them in Set F, will produce similar results, and that the color changes persist for a long time after the samples are returned to normal conditions. The following samples show color changes in the unexposed area which are still noticeable after several months.

Samples Which Show Color Changes in the Unexposed Area.

133 Direct Sky Blue 6B Conc. on cotton.
134 Direct Sky Blue 6B Conc. on cotton.
137 Pontamine Copper Blue RRX on cotton.
138 Pontamine Copper Blue RRX on cotton.
150 Brilliant Sky Blue 5G on cotton.
186 Direct Fast Blue RW on cotton.
276 Kryogene Violet 3RX on cotton.
277 Cross-Dye Green 2G Conc. on cotton.
279 Sulphur Black R Ex. Conc. on cotton.
280 Sulphur Black R Ex. Conc. on cotton.
299 Indanthrene Gray 3B Double Paste on cotton.
355 Thioindigo Red B Paste on cotton.
526 Anthrene Dark Blue BO 25% on silk.
661 Alizarine Rubinol R on wool.
663 Alizarine Rubinol R on wool.
664 Alizarine Geranol B on wool.
665 Alizarine Geranol B on wool.
667 Alizarine Direct Violet ER on wool.
668 Alizarine Direct Violet ER on wool.
669 Alizarine Direct Violet ER on wool.
671 Alizarine Fast Gray 2BL on wool.
672 Alizarine Fast Gray 2BL on wool.
683 Alizarine Red S on wool.
684 Alizarine Red S on wool.
751 Neolan Blue 2G on wool.
832 Ciba Violet B Powder on silk.
833 Ciba Violet B Powder on silk.
928 Pyrogen Green GK on cotton.
930 Sulfogene Carbon BB Conc. on cotton.
931 Sulfogene Carbon BB Conc. on cotton.
944 Ponsol Violet RRD Paste on cotton.
950 Ponsol Dark Blue BR Paste on cotton.
951 Ponsol Dark Blue BR Paste on cotton.
954 Ponsol Green BN Paste on cotton.
957 Ponsol Green BN Paste on cotton.
986 Ciba Violet B Powder on cotton.
987 Ciba Violet B Powder on cotton.
989 Indigo MLB/6B Powder on cotton.
1000 Methylene Green B on cotton.
1001 Methylene Green B on cotton.
1010 New Blue DA Conc. on cotton.
1032 Capri Blue GON on cotton.
1307 Neolan Green B on wool.
1308 Neolan Green B on wool.
1309 Neolan Green B on wool.
1310 Neolan Blue 2G on wool.
1311 Neolan Blue 2G on wool.
1327 Indigo on wool.
1331 Beta-naphthol and alpha-naphthylamine on cotton.
1363 Indanthrene Olive R Paste on cotton.
1370 Indo Carbon CL on cotton.
1371 Indo Carbon CL on cotton.
1402 Thioindigo Red B Paste on wool.
1403 Thioindigo Red B Paste on wool.
1405 Ciba Blue 2B Powder on wool.
1411 Alizarine Black RB Powder on wool.
1412 Alizarine Black RB Powder on wool.
1413 Alizarine Black RB Powder on wool.
1440 Kiton Fast Red 4 BL on wool.
1447 Direct Black EG on weighted silk.
1495 Sulphur Black T Extra on cotton.

4. Reversal When Kept in the Dark.

It was found that in some instances the appearance of the dyeing several weeks after the exposure was completed was sufficiently different from the original appearance to suggest that the sample had changed in color

during storing. One obvious case is that of Violamine, sample number 465. The exposed area of this sample was very much darker than the unexposed when first examined, but later was found to have partially reverted to its original color. It is difficult to trace such behavior, but our observations lead to the conclusion that in work of this kind samples should be examined immediately after exposure and again later, to discover temporary effects.

5. Fastness of the Same Dye on Different Fibers.

A study of the fastness of a given dye on different fibers was not contemplated when this work was started. As a result, the 136 dyes which occur on more than one fiber were often not from the same source or were not applied to the different fibers in the same strength. The samples have been examined carefully, but the detailed observations need not be listed here. Some of the dyes are faster on one fiber, others on another, and no general rule for all dyes can be made at this time. We hope to make a further study along these lines in the near future.

6. Relation of Color to Fastness.

The notion that particular hues are more fugitive than others is very persistent. This work shows that dyeings of all the principal hues are to be found in both the fast and fugitive groups. The chemical constitution of a dye rather than the color determines its fastness. Certain particularly bright or pure colors are unobtainable with fast dyes.

7. "Fast" Dyes.

It may be of interest to name the dyeings which have withstood sunlight and daylight for nearly six months when exposed continuously, under window glass, at an angle of 45 degrees from the horizontal, facing south. It cannot be said that any of these are strictly a match in color for the unexposed dyeings. However, the following dyeings have changed very little in color and are the fastest of those tested. All of the cotton dyeings have changed in color and accordingly they are not represented in this list. The silk dyeings in this list are all badly tendered and the dyes have in fact outlasted the fiber to which they were applied.

Dyeings Which Have Faded Very Little in Nearly Six Months Continuous Exposure, Set E Conditions

79	2%	Direct Fast Yellow NN on silk.
501	5%	Indanthrene Brilliant Violet BBK Powder on silk.
505	20%	Ponsol Blue GD Double Powder on silk.
507	5%	Indanthrene Blue 5G Powder on silk.
509	5%	Hydron Brown G Powder on silk.
540	8%	Anthranol Fast Black SE on wool.
631	5%	Direct Fast Yellow NN on wool.
721	5%	Xylene Light Yellow 2G on wool.
730	5%	Kiton Fast Yellow 3G on wool.
834	10%	Ciba Pink BG Powder on silk.
909	40%	Alizarine Indigo Brown R Paste on silk.
1303	8%	Alizarol Black 3G on wool.
1330	15%	Indigosol O on wool.
1397	5%	Fast Light Yellow 3G on wool.

IX. Acknowledgment

This investigation has had not only the support of the American Association of Textile Chemists and Colorists and the Bureau of Standards, but that of a number of individuals and firms. To all of them the authors and the sub-committee wish to acknowledge their indebtedness.

The dyeings were made by no less than eighteen co-operating laboratories, as follows:

American Printing Company.
American Woolen Company.
Arlington Mills.
Calco Chemical Company.
Carbic Color & Chemical Company, Inc.
Cheney Brothers.
Ciba Company.
E. I. du Pont de Nemours & Co.
Franklin Mills.
Geigy Company, Inc.
General Dyestuff Corporation.
Mount Hope Finishing Company.
National Aniline & Chemical Company, Inc.
National Silk Dyeing Company.
Newport Chemical Works, Inc.
Oriental Silk Printing Company.
Pacific Mills.
U. S. Testing Company.

The exposure of so large a number of samples and

TABLE 1

Spectral Distribution of the Radiation * from the Glass-Enclosed Carbon Arc Lamp Compared with Sunlight at Washington, D. C., on May 25, 1928, 11 to 12 A. M.

Spectral Range	Per Cent of the Total Radiation	
	Arc	Sun
180— 320 mμ	0.0	1.6
320— 360 mμ	2.0	3.2
360— 480 mμ	18.5	12.6
480— 600 mμ	9.3	21.9
600— 1400 mμ	16.5	38.9
1400— 4200 mμ	22.1	21.4
4200—12000 mμ	31.6	0.4

*Measurements by W. W. Coblentz, Bureau of Standards.

the preparation of the records required constant attention and care. Isabel M. Welch during 1926 and 1927 and W. C. Smith during 1927, 1928 and 1929 have carried out this work most satisfactorily and their assistance is gratefully acknowledged.

The membership of the sub-committee follows:

Wm. H. Cady, *Chairman*	Arthur E. Hirst
Wm. D. Appel	George A. Moran
Hugh Christison	Walter M. Scott

TABLE 2

List of Samples and Comparison of the Fading Under Different Conditions of Exposure (Sets B to H) with That in the "Standard" Sun-Through-Glass Exposure (Set A)

EXPLANATION OF TABLE 2

The serial number and Colour Index * number of the samples are given in columns 1 and 2. Column 3 gives the dyeing strength,† name and manufacturer of the dye,‡ and column 4 the fiber on which the dye was applied; C = cotton, W = wool, S = silk, and SW = weighted silk. The dyeing method is indicated in column 5 by a number which refers to Table 6. The group number in column 6 is a key to the time of exposure of the samples as given in Tables 8 to 13. The remainder of Table 2 is a sample-by-sample comparison of Sets B, D, E, F and G-H exposures with Set A exposures. The "x" in the column under L indicates that the sample is *less* faded than in Set A. Similarly, when the "x" appears under M, the sample is *more* faded; when under = it is faded to the same extent as in Set A. The column between those headed L and = is for *slightly less* faded samples, and that between = and M is for *slightly more* faded samples. The "slightly more" and "slightly less" categories are significant chiefly in showing the general trend of the fading. The "less than" and "more than" categories consist of samples which show a decided divergence from the corresponding Set A samples, and therefore require special consideration.

---

* See footnote 7 in the text.

† The dyeings are full shades if the strength is not indicated.

‡ The abbreviations used to indicate the manufacturers are listed at the end of this explanation.

Abbreviations of Manufacturers' Names

AAP—American Aniline Products, Inc.
BDC—British Dyestuffs Corporation, Ltd.
CAL—Calco Chemical Company.
CAMP—John Campbell & Co.
CENT—Central Dyestuff & Chemical Company.
CHEM—Chemical Company of America.
CIBA—Ciba Company, Inc.
DAV—Albert David Chemical Company.
DH—Durand, Huguenin & Co.
DP—E. I. du Pont de Nemours & Co.
GARF—Garfield Aniline Works.
GEI—Geigy Company, Inc.
GEN—General Dyestuff Corporation.
NA—National Aniline & Chemical Company, Inc.
NEW—Newport Chemical Works, Inc.
PEER—Peerless Color Company.
PHAR—Pharma-Chemical Corporation.
SAN—Sandoz Chemical Works.
SCOT—Scottish Dyes, Ltd.
SW—Sherwin-Williams Company.
U. S.—United States Color & Chemical Company.
ZIN—Zinsser & Co.

TABLE 2—*Continued*

SERIAL NUMBER	COLOUR INDEX NUMBER	DYE AMOUNT	DYE NAME	DYE MANUFACTURER	FIBER	DYEING METHOD	GROUP	COMPARISON WITH SET A: SET B L = M	SET D L = M	SET E L = M	SET F L = M	SETS G & H L = M
1440	-	5.0%	KITON FAST RED 4BL	CIPA	W	1	4	X	X	X	X	X
1441	-	1.0%	PONTACYL LIGHT RED BL	DP	W	1	4	X	X	X	X	X
1442	-	2.0%	PONTACYL LIGHT RED BL	DP	W	1	4	X	X	X	X	X
1443	-	5.0%	PONTACYL LIGHT RED BL	DP	W	1	4	X	X	X	X	X
1444	1246	20.0%	LOGWOOD CRYSTALS - BLACK IRON LIQUOR	-	SW	11	4	X	X	X	X	X
1445	593	0.50%	DIRECT GREEN B	NEW	SW	5	1	X	X	X	X	X
1446	593	2.0%	DIRECT GREEN B	NE	SW	5	1	X	X	X	X	X
1447	581	1.0%	DIRECT BLACK EG 200%	NE	SW	5	1	X	X	X	X	X
1448	581	5.0%	DIRECT BLACK EG 200%	NE	SW	5	2	X	X	X	X	X
1449	478	0.50%	ERIE ORANGE Y	NA	SW	5	1	X	X	X	X	X
1450	478	2.0%	ERIE ORANGE Y	NA	SW	5	2	X	X	X	X	X
1451	382	0.50%	ERIE SCARLET 3B	NA	SW	5	1	X	X	X	X	X
1452	382	2.0%	ERIE SCARLET 3B	NA	SW	5	2	X	X	X	X	X
1453	382	0.50%	ERIE SCARLET B	NA	SW	5	1	X	X	X	X	X
1454	382	2.0%	ERIE SCARLET B	NA	SW	5	2	X	X	X	X	X
1455	365	0.50%	CHRYSOPHENINE XXX CONC	NEW	SW	5	3	X	X	X	X	X
1456	365	2.0%	CHRYSOPHENINE XXX CONC	NEW	SW	5	4	X	X	X	X	X
1457	698	0.50%	WOOL VIOLET 4BN	NA	SW	5	1	X	X	X	X	X
1458	698	2.0%	WOOL VIOLET 4BN	NA	SW	5	1	X	X	X	X	X
1459	667	0.50%	FAST ACID GREEN B	NA	SW	5	1	X	X	X	X	X
1460	667	2.0%	FAST ACID GREEN B	NA	SW	5	1	X	X	X	X	X
1461	289	0.50%	FAST WOOL CYANONE 3R	NA	SW	5	1	X	X	X	X	X
1462	289	2.0%	FAST WOOL CYANONE 3R	NA	SW	5	2	X	X	X	X	X
1463	289	0.50%	FAST WOOL CYANONE R	NA	SW	5	1	X	X	X	X	X
1464	289	2.0%	FAST WOOL CYANONE R	NA	SW	5	2	X	X	X	X	X
1465	-	0.50%	SOLANTINE BROWN R	NA	S	3	3	X	X	X	X	X
1466	-	2.0%	SOLANTINE BROWN R	NA	S	3	3	X	X	X	X	X
1467	737	0.50%	WOOL GREEN S	NA	S	1	1	X	X	X	X	X
1468	737	2.0%	WOOL GREEN S	NA	S	1	1	X	X	X	X	X
1469	699	0.50%	ACID FAST VIOLET BG	NA	S	1	1	X	X	X	X	X
1470	699	2.0%	ACID FAST VIOLET BG	NA	S	1	1	X	X	X	X	X
1471	382	0.50%	ERIE SCARLET B	NA	S	3	2	X	X	X	X	X
1472	382	2.0%	ERIE SCARLET B	NA	S	3	2	X	X	X	X	X
1473	289	0.50%	FAST WOOL CYANONE 3R	NA	S	1	2	X	X	X	X	X
1474	289	2.0%	FAST WOOL CYANONE 3R	NA	S	1	2	X	X	X	X	X
1475	289	0.50%	FAST WOOL CYANONE R	NA	S	1	2	X	X	X	X	X
1476	289	2.0%	FAST WOOL CYANONE R	NA	S	1	2	X	X	X	X	X
1477	176	2.0%	FAST RED A	GEN	SW	1	1	X	X	X	X	X
1478	-	3.0%	SUPRAMINE YELLOW R	GEN	SW	2	4	X	X	X	X	X
1479	-	3.0%	ALIZARINE SUPRA BLUE A	GEN	SW	1	2	X	X	X	X	X
1480	-	3.0%	ACID ALIZARINE GRAY G	GEN	SW	1	1	X	X	X	X	X
1481	728	0.4%	VICTORIA BLUE R	GEN	SW	2	1	X	X	X	X	X
1482	176	2.0%	FAST RED A	GEN	S	1	2	X	X	X	X	X
1483	1104	2.50%	INDANTHRENE BRILLIANT VIOLET 2R PDR	GEN	S	6	1	X	X	X	X	X
1484	728	0.50%	VICTORIA BLUE R	GEN	S	2	1	X	X	X	X	X
1485	758	2.0%	FAST ACID VIOLET A2R	GEN	S	1	2	X	X	X	X	X
1486	-	2.0%	ACID ALIZARINE GRAY G	GEN	S	1	2	X	X	X	X	X
1487	1162	20.0%	CALEDON RED BN PASTE	SCOT	S	6	5	X	X	X	X	X
1488	419	2.0%	CHLORAZOL FAST RED FG	BDC	S	2	3	X	X	X	X	X
1489	394	2.0%	CHLORAZOL VIOLET N	BDC	S	2	2	X	X	X	X	X
1490	79	2.0%	PONCEAU RG	BDC	S	12	1	X	X	X	X	X
1491	680	1.0%	METHYL VIOLET 2B	BDC	S	13	1	X	X	X	X	X
1492	1115	25.0%	INDANTHRENE BLUE GC PASTE	GEN	C	7	5	X	X	X	X	X
1493	135	1.0%	INDOINE BLUE R	GEN	C	9	1	X	X	X	X	X
1494	518	5.0%	CHICAGO BLUE 6B	GEN	C	1	1	X	X	X	X	X
1495	978	8.0%	SULPHUR BLACK T EXTRA	GEN	C	8	4	X	X	X	X	X
1496	971	10.0%	HYDRON BLUE G PASTE	GEN	C	7	3	X	X	X	X	X
1497	922	0.8%	METHYLENE BLUE BG	GEN	C	9	1	X	X	X	X	X
1498	-	20.0%	KRYOGEN VIOLET 3R	GEN	C	8	2	X	X	X	X	X
1499	278	2.5%	BENZO FAST RED 8BL	GEN	C	1	2	X	X	X	X	X
1500	5	7.0%	NAPHTHOL GREEN B	GEN	W	1	5	X	X	X	X	X
1501	-	4.0%	ANTHRAQUINONE GREEN GXNO	GEN	W	1	4	X	X	X	X	X
1502	419	2.50%	DIAMINE FAST RED F	GEN	W	4	4	X	X	X	X	X
1503	54	4.50%	AZO ACID RED B	GEN	W	1	3	X	X	X	X	X
1504	184	2.75%	AMARANTH	GEN	W	1	2	X	X	X	X	X
1505	758	5.0%	ACID VIOLET 4RN	GEN	W	1	1	X	X	X	X	X
1506	79	1.50%	PONCEAU RR	GEN	W	1	1	X	X	X	X	X
1507	1180	3.0%	INDIGOTINE I	GEN	W	1	1	X	X	X	X	X
1508	1039	-	TURKEY RED (ALIZARINE GY)	BDC	C	14	4	X	X	X	X	X

TABLE 2—*Continued*

SERIAL NUMBER	COLOUR INDEX NUMBER	AMOUNT	DYE NAME	MANUFACTURER	FIBER	DYEING METHOD	GROUP	COMPARISON WITH SET A									
								SET B		SET D		SET E		SET F		SETS G & H	
								L	M	L	M	L	M	L	M	L	M
141	273	2.0%	PONTAMINE BROWN D3G	DP	C	1	1	X			X	X			X	X	
142	273	0.5%	PONTAMINE BROWN D3G	DP	C	1	1	X			X	X		X		X	
143	-	2.0%	CHLORAZOL FAST BROWN RK	BDC	C	1	2	X		X		X		X			X
144	-	0.5%	CHLORAZOL FAST BROWN RK	BDC	C	1	2	X		X		X		X			X
145	-	2.0%	DIAMINE CATECHINE B	GEN	C	1	1	X			X	X		X		X	
146	-	0.5%	DIAMINE CATECHINE B	GEN	C	1	1	X		X		X		X		X	
147	420	0.5%	DIRECT FAST BROWN M	NEW	C	1	1	X		X		X		X		X	
148	420	2.0%	DIRECT FAST BROWN M	NEW	C	1	1	X		X		X		X		X	
149	710	0.5%	BRILLIANT SKY BLUE 5G	GEN	C	1	1	X			X		X		X	X	
150	710	2.0%	BRILLIANT SKY BLUE 5G	GEN	C	1	1	X			X		X		X	X	
151	346	0.5%	PONTAMINE LIGHT YELLOW 5 GX	DP	C	1	2	X		X		X		X			X
152	346	2.0%	PONTAMINE LIGHT YELLOW 5 GX	DP	C	1	2	X		X		X		X			X
153	-	0.5%	BRILLIANT BENZO FAST YELLOW GL	GEN	C	1	2	X		X		X		X		X	
154	-	2.0%	BRILLIANT BENZO FAST YELLOW GL	GEN	C	1	2	X		X		X			X		X
155	620	0.5%	PONTAMINE YELLOW SX	DP	C	1	1	X		X		X		X			X
156	620	2.0%	PONTAMINE YELLOW SX	DP	C	1	1	X		X		X		X			X
157	365	0.3%	CHRYSOPHENINE XXX CONC	NEW	C	1	2	X		X		X		X		X	
158	365	1.5%	CHRYSOPHENINE XXX CONC	NEW	C	1	3	X		X		X		XA		X	
159	-	0.5%	BENZO FAST GRAY BL	GEN	C	1	3	X		X		X		XA		X	
160	-	2.0%	BENZO FAST GRAY BL	GEN	C	1	3	X		X		X		XA		X	
161	539	0.5%	ERIE BLACK NR EXTRA	NA	C	1	1	X		X		X		X		X	
162	539	5.0%	ERIE BLACK NR EXTRA	NA	C	1	1	X			X	X		X		X	
163	-	0.5%	BENZO FAST BLUE 8GL	GEN	C	1	2	X		X		X		X		X	
164	-	2.0%	BENZO FAST BLUE 8GL	GEN	C	1	2	X		X		X		X			X
165	406	0.5%	DIRECT BLUE 2B CONC	NEW	C	1	1	X			X		X		X	X	
166	406	2.0%	DIRECT BLUE 2B CONC	NEW	C	1	1	X			X		X		X	X	
167	394	0.5%	PONTAMINE VIOLET N	DP	C	1	2	X			X	X			X	X	
168	394	2.0%	PONTAMINE VIOLET N	DP	C	1	2	X		X		X			X	X	
169	471	0.5%	ERIE VIOLET 2B	NA	C	1	1	X		X		X		X		X	
170	471	2.0%	ERIE VIOLET 2B	NA	C	1	1	X			X	X		X			X
171	126	0.5%	DIRECT FAST PINK E2GN	NEW	C	1	1		X		X		X		X	X	
172	126	2.0%	DIRECT FAST PINK E2GN	NEW	C	1	1		X		X		X		X	X	
173	128	0.5%	ERIE PINK 2B	NA	C	1	1		X		X		X		X		X
174	128	2.0%	ERIE PINK 2B	NA	C	1	1		X		X		X		X		X
175	814	0.5%	DIRECT FAST YELLOW NN	NEW	C	1	2		X		X		X		X		X
176	814	2.0%	DIRECT FAST YELLOW NN	NEW	C	1	3	X			X		X		XB		X
177	594	0.5%	PONTAMINE GREEN GX	DP	C	1	1		X			X		X		X	
178	594	2.0%	PONTAMINE GREEN GX	DP	C	1	1		X			X		X			X
179	-	0.75%	CHLORANTINE FAST GREEN B	CIBA	C	1	2			X		X		X			X
180	-	3.0%	CHLORANTINE FAST GREEN B	CIBA	C	1	2			X		X		X			X
181	593	0.5%	ERIE GREEN MT	NA	C	1	1		X		X		X		X		X
182	593	2.0%	ERIE GREEN MT	NA	C	1	1		X			X		X			X
183	502	0.25%	BENZO AZURINE G EXTRA	NEW	C	1	1		X		X		X		X		X
184	502	1.0%	BENZO AZURINE G EXTRA	NEW	C	1	1		X			X		X			X
185	512	0.5%	DIRECT FAST BLUE RW	NEW	C	1	1		X			X			X		X
186	512	2.0%	DIRECT FAST BLUE RW	NEW	C	1	1		X			X		X			X
187	-	0.5%	DIRECT FAST BLUE SFF	NEW	C	1	2		X		X		X		X		X
188	-	2.0%	DIRECT FAST BLUE SFF	NEW	C	1	2		X		X		X		X		X
189	-	0.5%	CHLORANTINE FAST VIOLET 4BL	CIBA	C	1	2		X			X		X			X
190	-	2.0%	CHLORANTINE FAST VIOLET 4BL	CIBA	C	1	3		X			X		X			X
191	278	0.5%	PONTAMINE FAST RED 8BL	DP	C	1	2		X		X		X		X		X
192	278	2.0%	PONTAMINE FAST RED 8BL	DP	C	1	2		X			X		X			X
193	419	0.5%	ERIE FAST RED FD	NA	C	1	2		X			X		X		X	
194	419	2.0%	ERIE FAST RED FD	NA	C	1	3		X			X		X		X	
195	326	0.5%	ERIE FAST SCARLET 4BA	NA	C	1	1		X			X		X		X	
196	326	2.0%	ERIE FAST SCARLET 4BA	NA	C	1	1		X			X		X			X
197	816	0.5%	THIOFLAVINE S	DP	C	1	1		X			X		X			X
198	816	2.0%	THIOFLAVINE S	DP	C	1	1		X			X		X			X
199	-	10.0%	DIAZINE BLACK V	NA	S	9	3		X			X			BX	X	
200	471	4.0%	ERIE VIOLET 2B	NA	S	7	1		X		X		X		X		X
201	813	2.0%	DIRECT PURE YELLOW M	NEW	S	3	1		X			X		X			X
202	813	0.5%	DIRECT PURE YELLOW M	NEW	S	3	1		X			X		X			X
203	326	2.0%	DIRECT FAST ORANGE RS	NEW	S	3	2		X		X		X		X		X
204	326	0.5%	DIRECT FAST ORANGE RS	NEW	S	3	2		X		X		X		X		X
205	621	2.0%	DIRECT ORANGE 2R	NEW	S	3	2		X			X		X			X
206	621	0.5%	DIRECT ORANGE 2R	NEW	S	3	2		X			X		X			X
207	365	2.0%	CHRYSOPHENINE XXX CONC	NEW	S	3	3			X		X			XB		X
208	365	0.5%	CHRYSOPHENINE XXX CONC	NEW	S	3	2		X		X		X	X			X
209	873	3.0%	FAST SILK GRAY M CONC	NEW	S	2	1		X	X			X	X			X
210	873	1.0%	FAST SILK GRAY M CONC	NEW	S	2	1		X	X			X	X			X

TABLE 2—*Continued*

SERIAL NUMBER	COLOUR INDEX NUMBER	DYE AMOUNT	DYE NAME	DYE MANUFACTURER	FIBER	DYEING METHOD	GROUP	COMPARISON WITH SET A: SET B L	SET B M	SET D L	SET D M	SET E L	SET E M	SET F L	SET F M	SETS G & H L	SETS G & H M
984	1226	10.0%	CIBA RED G PASTE	CIBA	C	7	2	X		X		X		X			X
985	1226	40.0%	CIBA RED G PASTE	CIBA	C	7	3		X		X	X		XA			X
986	1222	1.25%	CIBA VIOLET B PDR	CIBA	C	7	2	X			X		X		X		X
987	1222	5.0%	CIBA VIOLET B PDR	CIBA	C	7	2	X			X		X		X	X	
988	1186	1.25%	INDIGO MLB/6B PDR	GEN	C	7	1	X		X		X		X		X	
989	1186	5.0%	INDIGO MLB/6B PDR	GEN	C	7	2	X			X	X			X	X	
990	1219	1.25%	HELINDONE VIOLET R PDR	GEN	C	7	1	X		X		X		X		X	
991	1219	5.0%	HELINDONE VIOLET R PDR	GEN	C	7	1	X		X		X		X		X	
992	662	1.0%	BRILLIANT GREEN CRYST	GRAS	C	9	1	X			X		X		X	X	
993	662	0.5%	BRILLIANT GREEN CRYST	GRAS	C	9	1	X			X		X		X	X	
994	843	1.0%	SAFRANINE 8B	NA	C	9	1	X			X		X		X	X	
995	843	0.5%	SAFRANINE 8B	NA	C	9	1	X			X		X		X	X	
996	657	1.0%	VICTORIA GREEN WB	NA	C	9	1	X			X		X		X	X	
997	657	0.5%	VICTORIA GREEN WB	NA	C	9	1	X			X		X		X	X	
998	841	1.0%	SAFRANINE A	NA	C	9	1	X			X		X		X	X	
999	841	0.5%	SAFRANINE A	NA	C	9	1	X			X		X		X	X	
1000	924	1.0%	METHYLENE GREEN B	NA	C	9	1	X		X		X		X			X
1001	924	0.5%	METHYLENE GREEN B	NA	C	9	1	X		X		X		X			X
1002	677	1.0%	FUCHSINE RS CONC	CAL	C	9	1	X			X		X		X	X	
1003	677	0.5%	FUCHSINE RS CONC	CAL	C	9	1	X			X		X		X	X	
1004	873	1.0%	FAST SILK GRAY M CONC	NEW	C	9	1	X		X		X		X		X	
1005	873	0.5%	FAST SILK GRAY M CONC	NEW	C	9	1	X		X		X		X			X
1006	749	1.0%	RHODAMINE B EXTRA	DP	C	9	1	X			X		X		X		X
1007	749	0.5%	RHODAMINE B EXTRA	DP	C	9	1	X			X		X		X		X
1008	922	1.0%	METHYLENE BLUE 2B	NA	C	9	1	X			X		X		X	X	
1009	922	0.5%	METHYLENE BLUE 2B	NA	C	9	1	X			X		X		X	X	
1010	909	1.0%	NEW BLUE DA CONC	NA	C	9	1	X		X		X		X			X
1011	909	0.5%	NEW BLUE DA CONC	NA	C	9	1	X		X		X		X			X
1012	752	1.0%	RHODAMINE 6GDN EXTRA	GEN	C	9	1	X			X		X		X	X	
1013	752	0.5%	RHODAMINE 6GDN EXTRA	GEN	C	9	1	X			X		X		X	X	
1014	680	1.0%	METHYL VIOLET 2B CONC	NA	C	9	1	X			X		X		X		X
1015	680	0.5%	METHYL VIOLET 2B CONC	NA	C	9	1	X			X		X		X		X
1016	729	1.0%	VICTORIA BLUE BX	DP	C	9	1	X			X		X		X		X
1017	729	0.5%	VICTORIA BLUE BX	DP	C	9	1	X			X		X		X		X
1018	655	1.0%	AURAMINE CONC	DP	C	9	1	X			X		X		X		X
1019	655	0.5%	AURAMINE CONC	DP	C	9	1	X			X		X		X		X
1020	913	1.0%	NILE BLUE BX	GEN	C	9	1	X			X		X		X		X
1021	913	0.5%	NILE BLUE BX	GEN	C	9	1	X		X		X		X			X
1022	815	1.0%	THIOFLAVINE T	GEN	C	9	1	X			X		X		X	X	
1023	815	0.5%	THIOFLAVINE T	GEN	C	9	1	X			X		X		X		X
1024	135	1.0%	INDOINE BLUE R	GEI	C	9	1	X			X		X	X			X
1025	135	0.5%	INDIONE BLUE R	GEI	C	9	1	X		X		X		X			X
1026	797	1.0%	EUCHRYSINE RRD	GEN	C	9	1	X			X		X		X		X
1027	797	0.5%	EUCHRYSINE RRD	GEN	C	9	1	X			X		X		X		X
1028	926	1.0%	THIONINE BLUE GO	GEN	C	9	1	X			X		X		X		X
1029	926	0.5%	THIONINE BLUE GO	GEN	C	9	1	X			X		X		X		X
1030	793	1.0%	PHOSPHINE G	DP	C	9	1	X			X		X		X		X
1031	793	0.5%	PHOSPHINE G	DP	C	9	1	X			X		X		X		X
1032	876	1.0%	CAPRI BLUE GON	GEN	C	9	2	X		X		X		X			X
1033	876	0.5%	CAPRI BLUE GON	GEN	C	9	1	X		X		X		X			X
1034	20	1.0%	CHRYSOIDINE Y EXTRA	NA	C	9	1	X			X		X		X		X
1035	20	0.5%	CHRYSOIDINE Y EXTRA	NA	C	9	1	X		X		X		X			X
1036	661	1.0%	TURQUOISE BLUE GL EXTRA	GEN	C	9	1	X			X		X		X		X
1037	661	0.5%	TURQUOISE BLUE GL EXTRA	GEN	C	9	1	X			X		X		X		X
1038	331	1.0%	BISMARCK BROWN Y	GEN	C	9	1	X			X		X		X		X
1039	331	0.5%	BISMARCK BROWN Y	GEN	C	9	1	X			X		X		X		X
1040	658	1.0%	SETOGLAUCINE	GEI	C	9	1		X		X		X		X		X
1041	658	0.5%	SETOGLAUCINE	GEI	C	9	1		X		X		X		X		X
1042	681	1.0%	CRYSTAL VIOLET P	GRAS	C	9	1	X			X		X		X		X
1043	681	0.5%	CRYSTAL VIOLET P	GRAS	C	9	1	X			X		X		X		X
1044	1109	30.0%	PONSOL BLUE 3G PASTE	DP	C	7	5	X		X		X		X		X	
1045	1109	10.0%	PONSOL BLUE 3G PASTE	DP	C	7	5	X		X		X		X		X	
1046	1172	7.5%	CIBANON BLACK 2B PASTE	CIBA	C	7	5	X		X		X		X		X	
1047	1172	1.5%	CIBANON BLACK 2B PASTE	CIBA	C	7	3	X		X		X		XA		X	

TABLE 2—*Continued*

SERIAL NUMBER	COLOUR INDEX NUMBER	DYE AMOUNT	DYE NAME	DYE MANUFACTURER	FIBER	DYEING METHOD	GROUP	COMPARISON WITH SET A: SET B L = M	SET D L = M	SET E L = M	SET F L = M	SETS G & H L = M
421	57	1.0%	FAST CRIMSON 6BL	NA	W	1	1	X	X	X	X	X
422	57	0.2%	FAST CRIMSON 6BL	NA	W	1	1	X	X	X	X	X
423	801	5.0%	QUINOLINE YELLOW O	GEN	W	1	2	X	X	X	X	X
424	801	1.0%	QUINOLINE YELLOW O	GEN	W	1	1	X	X	X	X	X
425	801	0.2%	QUINOLINE YELLOW O	GEN	W	1	1	X	X	X	X	X
426	184	5.0%	AMACID AMARANTH	AAP	W	1	3	X	X	X	XB	X
427	184	1.0%	AMACID AMARANTH	AAP	W	1	2	X	X	X	X	X
428	184	0.2%	AMACID AMARANTH	AAP	W	1	1	X	X	X	X	X
429	57	1.0%	ETHONIC FAST FUCHSINE 2B	CAMP	W	1	2	X	X	X	X	X
430	57	5.0%	ETHONIC FAST FUCHSINE 2B	CAMP	W	1	3	X	X	X	AX	X
431	57	0.2%	ETHONIC FAST FUCHSINE 2B	CAMP	W	1	1	X	X	X	X	X
432	-	5.0%	FAST CRIMSON R	NA	W	1	2	X	X	X	X	X
433	-	1.0%	FAST CRIMSON R	NA	W	1	2	X	X	X	X	X
434	-	0.2%	FAST CRIMSON R	NA	W	1	1	X	X	X	X	X
435	138	5.0%	METANIL YELLOW 1955	NA	W	2	1	X	X	X	X	X
436	138	1.0%	METANIL YELLOW 1955	NA	W	2	2	X	X	X	X	X
437	138	0.2%	METANIL YELLOW 1955	NA	W	2	2	X	X	X	X	X
438	27	5.0%	WOOL ORANGE GG	NA	W	1	5	X	X	X	X	X
439	27	1.0%	WOOL ORANGE GG	NA	W	1	2	X	X	X	X	X
440	27	0.2%	WOOL ORANGE GG	NA	W	1	2	X	X	X	X	X
441	735	5.0%	ERIO GREEN EXTRA	GEI	W	1	1	X	X	X	X	X
442	735	1.0%	ERIO GREEN EXTRA	GEI	W	1	1	X	X	X	X	X
443	735	0.2%	ERIO GREEN EXTRA	GEI	W	1	1	X	X	X	X	X
444	151	5.0%	WOOL ORANGE A	NA	W	1	5	X	X	X	X	X
445	151	1.0%	WOOL ORANGE A	NA	W	1	3	X	X	X	XB	X
446	151	0.2%	WOOL ORANGE A	NA	W	1	1	X	X	X	X	X
447	54	5.0%	AZO CRIMSON S	GEN	W	1	3	X	X	X	XB	X
448	54	1.0%	AZO CRIMSON S	GEN	W	1	1	X	X	X	X	X
449	54	0.2%	AZO CRIMSON S	GEN	W	1	2	X	X	X	X	X
450	737	5.0%	WOOL GREEN BSNA	GEN	W	1	2	X	X	X	X	X
451	737	1.0%	WOOL GREEN BSNA	GEN	W	1	1	X	X	X	X	X
452	737	0.2%	WOOL GREEN BSNA	GEN	W	1	1	X	X	X	X	X
453	56	5.0%	FAST FUCHSINE 6B	NA	W	1	2	X	X	X	X	X
454	56	1.0%	FAST FUCHSINE 6B	NA	W	1	2	X	X	X	X	X
455	56	0.2%	FAST FUCHSINE 6B	NA	W	1	1	X	X	X	X	X
456	-	5.0%	ETHONIC FAST VIOLET 2RLN	CAMP	W	2	3	X	X	X	XB	X
457	-	1.0%	ETHONIC FAST VIOLET 2RLN	CAMP	W	2	2	X	X	X	X	X
458	-	0.2%	ETHONIC FAST VIOLET 2RLN	CAMP	W	2	2	X	X	X	X	X
459	252	5.0%	CROCEIN SCARLET MOO	SW	W	1	5	X	X	X	X	X
460	252	1.0%	CROCEIN SCARLET MOO	SW	W	1	3	X	X	X	XB	X
461	252	0.2%	CROCEIN SCARLET MOO	SW	W	1	2	X	X	X	X	X
462	153	5.0%	AZO FUCHSINE GA	GEN	W	1	2	X	X	X	X	X
463	153	0.2%	AZO FUCHSINE GA	GEN	W	1	2	X	X	X	X	X
464	153	1.0%	AZO FUCHSINE GA	GEN	W	1	2	X	X	X	X	X
465	758	5.0%	VIOLAMINE DSA	DAV	W	2	1	X	X	X	X	X
466	758	1.0%	VIOLAMINE DSA	DAV	W	2	1	X	X	X	X	X
467	758	0.2%	VIOLAMINE DSA	DAV	W	2	1	X	X	X	X	X
468	31	5.0%	PONTACYL CARMINE 2G	DP	W	1	3	X	X	X	XA	X
469	31	1.0%	PONTACYL CARMINE 2G	DP	W	1	2	X	X	X	X	X
470	31	0.2%	PONTACYL CARMINE 2G	DP	W	1	2	X	X	X	X	X
471	-	2.0%	CHLORANTINE FAST VIOLET 4BL	CIBA	S	3	2	X	X	X	X	X
472	-	0.5%	CHLORANTINE FAST VIOLET 4BL	CIBA	S	3	2	X	X	X	X	X
473	-	2.0%	CHLORAMINE FAST ORANGE ER	GARF	S	3	2	X	X	X	X	X
474	-	0.5%	CHLORAMINE FAST ORANGE ER	GARF	S	3	2	X	X	X	X	X
475	-	2.0%	PONTAMINE FAST ORANGE EG	DP	S	3	3	X	X	X	XB	X
476	-	0.5%	PONTAMINE FAST ORANGE EG	DP	S	3	2	X	X	X	X	X
477	-	2.0%	BRILLIANT BENZO FAST YELLOW GL	GEN	S	3	2	X	X	X	X	X
478	-	0.5%	BRILLIANT BENZO FAST YELLOW GL	GEN	S	3	2	X	X	X	X	X
479	561	2.0%	TRISULPHON BROWN B	SAN	S	3	1	X	X	X	X	X
480	561	0.5%	TRISULPHON BROWN B	SAN	S	3	1	X	X	X	X	X
481	-	2.0%	BENZO FAST GRAY BL	GEN	S	3	2	X	X	X	X	X
482	-	0.5%	BENZO FAST GRAY BL	GEN	S	3	2	X	X	X	X	X
483	-	2.0%	CHLORANTINE FAST GREEN B	CIBA	S	3	2	X	X	X	X	X
484	-	0.5%	CHLORANTINE FAST GREEN B	CIBA	S	3	2	X	X	X	X	X
485	816	2.0%	THIOFLAVINE S	DP	S	3	1	X	X	X	X	X
486	816	0.5%	THIOFLAVINE S	DP	S	3	1	X	X	X	X	X
487	273	2.0%	PONTAMINE BROWN D3G	DP	S	3	1	X	X	X	X	X
488	273	0.5%	PONTAMINE BROWN D3G	DP	S	3	1	X	X	X	X	X
489	-	2.0%	CHLORANTINE FAST YELLOW 4GL	CIBA	S	3	3	X	X	X	XB	X
490	-	0.5%	CHLORANTINE FAST YELLOW 4GL	CIBA	S	3	2	X	X	X	X	X

TABLE 2—*Continued*

SERIAL NUMBER	COLOUR INDEX NUMBER	DYE AMOUNT	DYE NAME	DYE MANUFACTURER	FIBER	DYEING METHOD	GROUP	COMPARISON WITH SET A: SET B L = M	SET D L = M	SET E L = M	SET F L = M	SETS G & H L = M
774	246	0.2%	ACID BLUE BLACK 10B	CIBA	W	1	1	X	X |	X |	X	X
775	667	5.0%	BRILLIANT MILLING GREEN 6B	GEN	W	2	1	X	X	X	X	|X
776	667	1.0%	BRILLIANT MILLING GREEN 6B	GEN	W	2	1	X	X	X	X	| X
777	667	0.2%	BRILLIANT MILLING GREEN 6B	GEN	W	2	1	X|	X	X|	X	X
778	666	5.0%	GUINEA GREEN	CIBA	W	1	1	X	X	X	X	| X
779	666	1.0%	GUINEA GREEN	CIBA	W	1	1	X	X	X|	X	X
780	666	0.2%	GUINEA GREEN	CIBA	W	1	1	X	X	X|	X	X
781	-	3.0%	METACHROME BLUE BLACK 2BX	GEI	W	6	5	|X	X	X	X	| X
782	-	1.0%	METACHROME BLUE BLACK 2BX	GEI	W	6	2	X	X	X	X	X
783	-	0.5%	METACHROME BLUE BLACK 2BX	GEI	W	6	2	X	X	X	X	X
784	1232	3.0%	FUSTIC CRYST	GEI	W	5	2	X	X	X	X|	X
785	1232	1.0%	FUSTIC CRYST	GEI	W	5	2	X	X	X	X	X
786	1246	6.0%	HEMATINE CRYST	GEI	W	5	3	X |	X	X |	XB	|X
787	299	6.0%	DIAMOND BLACK F	GEI	W	4	5	X|	X|	X	X	X
788	299	3.0%	DIAMOND BLACK F	GEI	W	4	5	X|	X	X	X	|X
789	299	1.0%	DIAMOND BLACK F	GEI	W	4	2	X	X |	X|	X |	X
790	652	4.0%	ERIO CHROME RED B	GEI	W	4	3	X	X	X	XB	X|
791	652	2.0%	ERIO CHROME RED B	GEI	W	4	2	X	X |	X|	X	X
792	652	1.0%	ERIO CHROME RED B	GEI	W	4	2	X	X	X	X	X
793	219	3.0%	ERIO CHROME FLAVINE A CONC	GEI	W	4	5	X	X	X	X	X|
794	219	1.0%	ERIO CHROME FLAVINE A CONC	GEI	W	4	5	X	X	X	X	X
795	219	0.25%	ERIO CHROME FLAVINE A CONC	GEI	W	4	3	|X	X	| X	AX	X
796	201	5.0%	ERIO CHROME BLUE BLACK BC	GEI	W	4	5	X	X|	X	X	X
797	201	3.0%	ERIO CHROME BLUE BLACK BC	GEI	W	4	3	X	X	X|	XB	X
798	201	1.0%	ERIO CHROME BLUE BLACK BC	GEI	W	4	2	X	X |	X|	X	X
799	203	5.0%	ERIO CHROME BLACK T	GEI	W	4	5	X	X	X	X	X
800	203	3.0%	ERIO CHROME BLACK T	GEI	W	4	5	X	X	X	X	X
801	203	1.0%	ERIO CHROME BLACK T	GEI	W	4	2	X	X	X|	X	|X
802	-	3.0%	ERIO CHROME CYANINE RC	GEI	W	4	3	X	X	X	XA	X |
803	-	1.0%	ERIO CHROME CYANINE RC	GEI	W	4	2	X	X	X	X	X
804	-	0.5%	ERIO CHROME CYANINE RC	GEI	W	4	2	|X	X	|X	X	X
805	202	6.0%	ERIO CHROME BLUE BLACK R	GEI	W	4	5	X	X|	X	X	X
806	202	3.0%	ERIO CHROME BLUE BLACK R	GEI	W	4	3	X	X	X	XB	X
807	202	1.0%	ERIO CHROME BLUE BLACK R	GEI	W	4	2	X	X|	X |	X	X
808	204	6.0%	ERIO CHROME BLACK A	GEI	W	4	5	X	X	X	X	|X
809	204	3.0%	ERIO CHROME BLACK A	GEI	W	4	3	|X	X	X	XB	X
810	204	1.0%	ERIO CHROME BLACK A	GEI	W	4	2	X	X|	X|	X	X
811	720	3.0%	ERIO CHROME AZUROL B	GEI	W	4	2	X	X	X	X	X
812	720	1.0%	ERIO CHROME AZUROL B	GEI	W	4	2	X	X	X	X	X
813	720	0.25%	ERIO CHROME AZUROL B	GEI	W	4	1	|X	X	X	X	|X
814	292	3.0%	ERIO CHROME VERDONE S	GEI	W	4	3	X	X	X	XB	X
815	292	1.0%	ERIO CHROME VERDONE S	GEI	W	4	2	X	X	X	X	X
816	292	0.5%	ERIO CHROME VERDONE S	GEI	W	4	2	X	X	X	X	X
817	1075	3.0%	ALIZARINE ASTROL B	GEN	W	1	2	X	X	X	X	X
818	1075	1.0%	ALIZARINE ASTROL B	GEN	W	1	2	X	X	X	X	X
819	1075	0.2%	ALIZARINE ASTROL B	GEN	W	1	2	X	X	X	X	X
820	-	5.0%	HYDRON BROWN R PDR	GEN	S	6	3	| X	X	| X	XA	X
821	-	0.5%	HYDRON BROWN R PDR	GEN	S	6	1	X	X	X	X	X
822	1116	5.0%	INDANTHRENE GREEN 2B PDR	GEN	S	6	2	X	X	X	X	X
823	1116	0.5%	INDANTHRENE GREEN 2B PDR	GEN	S	6	2	X	X	X	X	X
824	1132	5.0%	INDANTHRENE YELLOW GK PDR	GEN	S	6	1	X	X	X	X	| X
825	1132	0.5%	INDANTHRENE YELLOW GK PDR	GEN	S	6	1	X	X	X	X	|X
826	1104	5.0%	PONSOL VIOLET RRD PDR	DP	S	6	2	X	X	X	X	X
827	1104	0.5%	PONSOL VIOLET RRD PDR	DP	S	6	2	X	X	X	X	X
828	-	20.0%	HYDRON SKY BLUE FK PASTE	GEN	S	6	1	X	X	X	X	X
829	-	2.0%	HYDRON SKY BLUE FK PASTE	GEN	S	6	1	X	X	X	X	X
830	1096	10.0%	PONSOL GOLD ORANGE G DBL PDR	DP	S	6	1	X	X	X	X	X
831	1096	1.0%	PONSOL GOLD ORANGE G DBL PDR	DP	S	6	1	X	X	X	X	X
832	1222	5.0%	CIBA VIOLET B PDR	CIBA	S	6	1	X	X	X	X	| X
833	1222	0.5%	CIBA VIOLET B PDR	CIBA	S	6	1	X	X	X	X	| X
834	-	10.0%	CIBA PINK BG PDR	CIBA	S	6	5	X	X	X	X	|X
835	-	1.0%	CIBA PINK BG PDR	CIBA	S	6	2	X	X	X	X	X
836	1227	5.0%	HELINDONE BROWN G PDR	GEN	S	6	1	X	X	X	X	X
837	1227	0.5%	HELINDONE BROWN G PDR	GEN	S	6	1	X	X	X	X	X
838	1219	5.0%	HELINDONE VIOLET R PDR	GEN	S	6	1	X	X	X	X	X
839	1219	0.5%	HELINDONE VIOLET R PDR	GEN	S	6	1	X	X	X	X	X
840	-	10.0%	SULFANTHRENE PINK FF DBL PDR	DP	S	6	3	X	X	X	XB	X
841	-	1.0%	SULFANTHRENE PINK FF DBL PDR	DP	S	6	1	X	X	X	X	X
842	1189	5.0%	BRILLIANT INDIGO 4G PDR	GEN	S	6	1	X	X	X	X	X
843	1189	0.5%	BRILLIANT INDIGO 4G PDR	GEN	S	6	1	X	X	X	X	X

TABLE 2—*Continued*

SERIAL NUMBER	COLOUR INDEX NUMBER	DYE AMOUNT	DYE NAME	DYE MANUFACTURER	FIBER	DYEING METHOD	GROUP	COMPARISON WITH SET A: SET B L = M	SET D L = M	SET E L = M	SET F L = M	SETS G & H L = M
1370	-	1.5%	INDO CARBON CL	GEN	C	8	3	X	X	X	X	X
1371	-	6.0%	INDO CARBON CL	GEN	C	8	4	X	X	X	X	X
1372	-	-	NAPHTHOL ASSW & FAST BLACK LB BASE	GEN	C	10	4	X	X	X	X	X
1373	-	-	NAPHTHOL ASD & FAST SCARLET R SALT	GEN	C	10	3	X	X	X	X	X
1374	173	1.0%	METACHROME VIOLET B	GEN	W	6	1	X	X	X	X	X
1375	173	2.0%	METACHROME VIOLET B	GEN	W	6	1	X	X	X	X	X
1376	173	5.0%	METACHROME VIOLET B	GEN	W	6	2	X	X	X	X	X
1377	-	1.0%	OMEGA CHROME BROWN R	SAN	W	4	2	X	X	X	X	X
1378	-	2.0%	OMEGA CHROME BROWN R	SAN	W	4	3	X	X	X	X	X
1379	-	5.0%	OMEGA CHROME BROWN R	SAN	W	4	4	X	X	X	X	X
1380	168	1.0%	SUPERCHROME GARNET Y	NA	W	4	2	X	X	X	X	X
1381	168	2.0%	SUPERCHROME GARNET Y	NA	W	4	2	X	X	X	X	X
1382	168	5.0%	SUPERCHROME GARNET Y	NA	W	4	3	X	X	X	X	X
1383	-	1.0%	RADIO CHROME BLUE B	GEN	W	4	2	X	X	X	X	X
1384	-	2.0%	RADIO CHROME BLUE B	GEN	W	4	3	X	X	X	X	X
1385	-	5.0%	RADIO CHROME BLUE B	GEN	W	4	4	X	X	X	X	X
1386	209	1.0%	FAST WOOL BLUE B	NA	W	1	3	X	X	X	X	X
1387	209	2.0%	FAST WOOL BLUE B	NA	W	1	3	X	X	X	X	X
1388	209	5.0%	FAST WOOL BLUE B	NA	W	1	4	X	X	X	X	X
1389	146	1.0%	AZO YELLOW A5W	NA	W	1	1	X	X	X	X	X
1390	146	2.0%	AZO YELLOW A5W	NA	W	1	1	X	X	X	X	X
1391	146	5.0%	AZO YELLOW A5W	NA	W	1	1	X	X	X	X	X
1392	642	1.0%	POLAR YELLOW 5G CONC	GEI	W	1	4	X	X	X	X	X
1393	642	2.0%	POLAR YELLOW 5G CONC	GEI	W	1	4	X	X	X	X	X
1394	642	5.0%	POLAR YELLOW 5G CONC	GEI	W	1	5	X	X	X	X	X
1395	636	1.0%	FAST LIGHT YELLOW 3G	GEN	W	1	5	X	X	X	X	X
1396	636	2.0%	FAST LIGHT YELLOW 3G	GEN	W	1	5	X	X	X	X	X
1397	636	5.0%	FAST LIGHT YELLOW 3G	GEN	W	1	5	X	X	X	X	X
1398	-	0.50%	DIAZO GREEN 3G, DEV Z	GEN	C	3	1	X	X	X	X	X
1399	-	2.0%	DIAZO GREEN 3G, DEV Z	GEN	C	3	1	X	X	X	X	X
1400	-	0.50%	DIAZO GREEN 3G B NAPHTHOL	GEN	C	2	1	X	X	X	X	X
1401	-	2.0%	DIAZO GREEN 3G B NAPHTHOL	GEN	C	2	1	X	X	X	X	X
1402	1207	2.0%	THIO INDIGO RED B PASTE	GEN	W	7	4	X	X	X	X	X
1403	1207	5.0%	THIO INDIGO RED B PASTE	GEN	W	7	5	X	X	X	X	X
1404	1207	20.0%	THIO INDIGO RED B PASTE	GEN	W	7	5	X	X	X	X	X
1405	1184	2.0%	CIBA BLUE 2B PDR	CIBA	W	7	1	X	X	X	X	X
1406	1184	5.0%	CIBA BLUE 2B PDR	CIBA	W	7	1	X	X	X	X	X
1407	1184	30.0%	CIBA BLUE 2B PDR	CIBA	W	7	3	X	X	X	X	X
1408	-	0.25%	KROMEKO YELLOW CGW	CAMP	W	4	3	X	X	X	X	X
1409	-	0.50%	KROMEKO YELLOW CGW	CAMP	W	4	3	X	X	X	X	X
1410	-	1.0%	KROMEKO YELLOW CGW	CAMP	W	4	3	X	X	X	X	X
1411	-	1.0%	ALIZARINE BLACK RB PDR	ZIN	W	5	1	X	X	X	X	X
1412	-	3.0%	ALIZARINE BLACK RB PDR	ZIN	W	5	3	X	X	X	X	X
1413	-	6.0%	ALIZARINE BLACK RB PDR	ZIN	W	5	4	X	X	X	X	X
1414	-	1.0%	ALIZARINE RED WB	GEN	W	5	3	X	X	X	X	X
1415	-	2.0%	ALIZARINE RED WB	GEN	W	5	4	X	X	X	X	X
1416	-	5.0%	ALIZARINE RED WB	GEN	W	5	4	X	X	X	X	X
1417	1060	1.0%	ANTHRACENE BLUE SWGG PDR	GEN	W	5	2	X	X	X	X	X
1418	1060	2.0%	ANTHRACENE BLUE SWGG PDR	GEN	W	5	4	X	X	X	X	X
1419	1060	5.0%	ANTHRACENE BLUE SWGG PDR	GEN	W	5	5	X	X	X	X	X
1420	415	1.0%	PONTAMINE ORANGE R	DP	W	5	2	X	X	X	X	X
1421	415	2.0%	PONTAMINE ORANGE R	DP	W	5	2	X	X	X	X	X
1422	415	5.0%	PONTAMINE ORANGE R	DP	W	5	3	X	X	X	X	X
1423	-	1.0%	DIAMOND GREEN 3GA	GEN	W	4	1	X	X	X	X	X
1424	-	2.0%	DIAMOND GREEN 3GA	GEN	W	4	1	X	X	X	X	X
1425	-	5.0%	DIAMOND GREEN 3GA	GEN	W	4	4	X	X	X	X	X
1426	-	1.0%	FAST MORDANT BLUE B	CHEM	W	4	3	X	X	X	X	X
1427	-	2.0%	FAST MORDANT BLUE B	CHEM	W	4	3	X	X	X	X	X
1428	-	5.0%	FAST MORDANT BLUE B	CHEM	W	4	4	X	X	X	X	X
1429	246	2.0%	BUFFALO BLACK NBR	NA	W	1	3	X	X	X	X	X
1430	246	4.0%	BUFFALO BLACK NBR	NA	W	1	4	X	X	X	X	X
1431	246	8.0%	BUFFALO BLACK NBR	NA	W	1	5	X	X	X	X	X
1432	-	2.0%	BUFFALO BLACK 3G	NA	W	1	2	X	X	X	X	X
1433	-	4.0%	BUFFALO BLACK 3G	NA	W	1	3	X	X	X	X	X
1434	-	8.0%	BUFFALO BLACK 3G	NA	W	1	4	X	X	X	X	X
1435	59	1.0%	AZO ACID BLUE B	SAN	W	1	1	X	X	X	X	X
1436	59	2.0%	AZO ACID BLUE B	SAN	W	1	1	X	X	X	X	X
1437	59	5.0%	AZO ACID BLUE B	SAN	W	1	2	X	X	X	X	X
1438	-	1.0%	KITON FAST RED 4BL	CIBA	W	1	3	X	X	X	X	X
1439	-	2.0%	KITON FAST RED 4BL	CIBA	W	1	4	X	X	X	X	X

TABLE 2—*Continued*

SERIAL NUMBER	COLOUR INDEX NUMBER	DYE AMOUNT	DYE NAME	MANUFACTURER	FIBER	DYEING METHOD	GROUP	COMPARISON WITH SET A				
								SET B L = M	SET D L = M	SET E L = M	SET F L = M	SETS G & H L = M
634	382	5.0%	DIRECT FAST SCARLET B	CAL	W	3	5	X	X	X	X	X
635	382	1.0%	DIRECT FAST SCARLET B	CAL	W	3	2	X	X	X	X	X
636	382	0.2%	DIRECT FAST SCARLET B	CAL	W	3	1	X	X	X	X	X
637	382	5.0%	DIRECT FAST SCARLET 3B	CAL	W	3	2	X	X	X	X	X
638	382	1.0%	DIRECT FAST SCARLET 3B	CAL	W	3	1	X	X	X	X	X
639	382	0.2%	DIRECT FAST SCARLET 3B	CAL	W	3	1	X	X	X	X	X
640	519	5.0%	DIRECT FAST RED F	CAL	W	3	5	X	X	X	X	X
641	519	1.0%	DIRECT FAST RED F	CAL	W	3	3	X	X	X	XB	X
642	519	0.2%	DIRECT FAST RED F	CAL	W	3	2	X	X	X	X	X
643	10	5.0%	ACID YELLOW 1029	CAL	W	1	1	X	X	X	X	X
644	10	1.0%	ACID YELLOW 1029	CAL	W	1	1	X	X	X	X	X
645	10	0.2%	ACID YELLOW 1029	CAL	W	1	1	X	X	X	X	X
646	593	5.0%	DIRECT GREEN B	CAL	W	3	3	X	X	X	XB	X
647	593	1.0%	DIRECT GREEN B	CAL	W	3	2	X	X	X	X	X
648	593	0.2%	DIRECT GREEN B	CAL	W	3	1	X	X	X	X	X
649	714	5.0%	PATENT BLUE A	CAL	W	2	1	X	X	X	X	X
650	714	1.0%	PATENT BLUE A	CAL	W	2	1	X	X	X	X	X
651	714	0.2%	PATENT BLUE A	CAL	W	2	1	X	X	X	X	X
652	420	5.0%	DIRECT FAST BROWN M	CAL	W	3	3	X	X	X	XB	X
653	420	1.0%	DIRECT FAST BROWN M	CAL	W	3	1	X	X	X	X	X
654	420	0.2%	DIRECT FAST BROWN M	CAL	W	3	1	X	X	X	X	X
655	365	5.0%	DIRECT BRILLIANT YELLOW C	CAL	W	3	5	X	X	X	X	X
656	365	1.0%	DIRECT BRILLIANT YELLOW C	CAL	W	3	2	X	X	X	X	X
657	365	0.2%	DIRECT BRILLIANT YELLOW C	CAL	W	3	2	X	X	X	X	X
658	307	5.0%	SULPHON ACID BLACK B	CAL	W	2	3	X	X	X	XB	X
659	307	1.0%	SULPHON ACID BLACK B	CAL	W	2	2	X	X	X	X	X
660	307	0.2%	SULPHON ACID BLACK B	CAL	W	2	2	X	X	X	X	X
661	1091	3.0%	ALIZARINE RUBINOL R	GEN	W	1	2	X	X	X	X	X
662	1091	1.0%	ALIZARINE RUBINOL R	GEN	W	1	2	X	X	X	X	X
663	1091	0.2%	ALIZARINE RUBINOL R	GEN	W	1	2	X	X	X	X	X
664	1092	3.0%	ALIZARINE GERANOL B	GEN	W	1	2	X	X	X	X	X
665	1092	1.0%	ALIZARINE GERANOL B	GEN	W	1	2	X	X	X	X	X
666	1092	0.2%	ALIZARINE GERANOL B	GEN	W	1	3	X	X	X	XB	X
667	-	3.0%	ALIZARINE DIRECT VIOLET ER	GEN	W	1	2	X	X	X	X	X
668	-	1.0%	ALIZARINE DIRECT VIOLET ER	GEN	W	1	2	X	X	X	X	X
669	-	0.2%	ALIZARINE DIRECT VIOLET ER	GEN	W	1	2	X	X	X	X	X
670	-	3.0%	ALIZARINE FAST GRAY 2BL	GEN	W	1	5	X	X	X	X	X
671	-	1.0%	ALIZARINE FAST GRAY 2BL	GEN	W	1	2	X	X	X	X	X
672	-	0.2%	ALIZARINE FAST GRAY 2BL	GEN	W	1	2	X	X	X	X	X
673	1081	3.0%	ANTHRAQUINONE GREEN GXN	GEN	W	1	3	X	X	X	XB	X
674	1081	1.0%	ANTHRAQUINONE GREEN GXN	GEN	W	1	2	X	X	X	X	X
675	1081	0.2%	ANTHRAQUINONE GREEN GXN	GEN	W	1	2	X	X	X	X	X
676	1035	3.0%	ALIZARINE BROWN ZWS	ZIN	W	5	3	X	X	X	XB	X
677	1035	1.0%	ALIZARINE BROWN ZWS	ZIN	W	5	2	X	X	X	X	X
678	1035	0.2%	ALIZARINE BROWN ZWS	ZIN	W	5	2	X	X	X	X	X
679	1051	3.0%	ALIZARINE CYANINE BLUE GG EX	GEN	W	5	2	X	X	X	X	X
680	1051	1.0%	ALIZARINE CYANINE BLUE GG EX	GEN	W	5	2	X	X	X	X	X
681	1051	0.2%	ALIZARINE CYANINE BLUE GG EX	GEN	W	5	1	X	X	X	X	X
682	1034	3.0%	ALIZARINE RED S	GEN	W	5	3	X	X	X	XB	X
683	1034	1.0%	ALIZARINE RED S	GEN	W	5	2	X	X	X	X	X
684	1034	0.2%	ALIZARINE RED S	GEN	W	5	2	X	X	X	X	X
685	1062	3.0%	ANTHRACENE BLUE WR	GEN	W	5	5	X	X	X	X	X
686	1062	1.0%	ANTHRACENE BLUE WR	GEN	W	5	2	X	X	X	X	X
687	1062	0.2%	ANTHRACENE BLUE WR	GEN	W	5	2	X	X	X	X	X
688	1067	3.0%	ALIZARINE BLUE S	GEN	W	5	2	X	X	X	X	X
689	1067	1.0%	ALIZARINE BLUE S	GEN	W	5	1	X	X	X	X	X
690	1067	0.2%	ALIZARINE BLUE S	GEN	W	5	1	X	X	X	X	X
691	1085	3.0%	ALIZARINE BLUE-BLACK B	CHEM	W	5	5	X	X	X	X	X
692	1085	1.0%	ALIZARINE BLUE-BLACK B	CHEM	W	5	2	X	X	X	X	X
693	1085	0.2%	ALIZARINE BLUE-BLACK B	CHEM	W	5	1	X	X	X	X	X
694	1053	3.0%	ALIZARINE SAPPHIRE SE	GEN	W	1	2	X	X	X	X	X
695	1053	1.0%	ALIZARINE SAPPHIRE SE	GEN	W	1	1	X	X	X	X	X
696	1053	0.2%	ALIZARINE SAPPHIRE SE	GEN	W	1	1	X	X	X	X	X
697	1073	3.0%	ALIZARINE IRISOL R	GEN	W	1	2	X	X	X	X	X
698	1073	1.0%	ALIZARINE IRISOL R	GEN	W	1	1	X	X	X	X	X
699	1073	0.2%	ALIZARINE IRISOL R	GEN	W	1	1	X	X	X	X	X
700	1076	3.0%	CYANANTHROL R	GEN	W	1	2	X	X	X	X	X
701	1076	1.0%	CYANANTHROL R	GEN	W	1	2	X	X	X	X	X
702	1076	0.2%	CYANANTHROL R	GEN	W	1	2	X	X	X	X	X
703	1088	3.0%	ALIZARINE BLUE SKY	GEN	W	1	2	X	X	X	X	X

TABLE 2—*Continued*

SERIAL NUMBER	COLOUR INDEX NUMBER	AMOUNT	DYE NAME	MANUFACTURER	FIBER	DYEING METHOD	GROUP	COMPARISON WITH SET A									
								SET B		SET D		SET E		SET F		SETS G & H	
								L	M	L	M	L	M	L	M	L	M
281	-	4.0%	SULPHUR OLIVE G	GRAS	C	8	2	X		X		X		X			X
282	-	1.0%	SULPHUR OLIVE G	GRAS	C	8	2	X		X		X		X			X
283	956	4.0%	PYROGEN DIRECT BLUE RL	CIBA	C	8	2	X		X		X		X		X	
284	956	1.0%	PYROGEN DIRECT BLUE RL	CIBA	C	8	2	X		X		X		X		X	
285	-	4.0%	SULFOGENE INDIGO BLUE G CONC	DP	C	8	2	X		X		X		X		X	
286	-	1.0%	SULFOGENE INDIGO BLUE G CONC	DP	C	8	2	X		X		X		X		X	
287	1012	4.0%	SULFOGENE BORDEAUX 5B	DP	C	8	1	X		X		X		X		X	
288	1012	1.0%	SULFOGENE BORDEAUX 5B	DP	C	8	1	X		X		X		X		X	
289	949	4.0%	SULPHUR BROWN 2G	NA	C	8	2	X		X		X			X	X	
290	949	1.0%	SULPHUR BROWN 2G	NA	C	8	2	X			X	X			X	X	
291	-	4.0%	SULPHUR YELLOW 2G	NEW	C	8	2	X		X		X			X	X	
292	-	1.0%	SULPHUR YELLOW 2G	NEW	C	8	2	X		X		X			X	X	
293	948	4.0%	SULFOGENE YELLOW GA	DP	C	8	1	X		X		X		X		X	
294	948	1.0%	SULFOGENE YELLOW GA	DP	C	8	1	X		X		X		X		X	
295	1151	20.0%	INDANTHRENE BROWN R PASTE	GEN	C	7	5	X		X		X		X		X	
296	1151	5.0%	INDANTHRENE BROWN R PASTE	GEN	C	7	5		X	X		X			X		X
297	1145	20.0%	INDANTHRENE GRAY GK PASTE	GEN	C	7	5	X		X		X			X		X
298	1145	5.0%	INDANTHRENE GRAY GK PASTE	GEN	C	7	3	X			X	X			XA		X
299	-	10.0%	INDANTHRENE GRAY 3B DBL PASTE	GEN	C	7	5	X		X			X	X			X
300	-	2.5%	INDANTHRENE GRAY 3B DBL PASTE	GEN	C	7	3	X		X		X			XA		X
301	-	20.0%	INDANTHRENE BROWN 3R PASTE	GEN	C	7	5	X		X		X			X		X
302	-	5.0%	INDANTHRENE BROWN 3R PASTE	GEN	C	7	5		X	X		X			X		X
303	-	20.0%	INDANTHRENE YELLOW BROWN 3G PASTE	GEN	C	7	5	X		X		X		X			X
304	-	5.0%	INDANTHRENE YELLOW BROWN 3G PASTE	GEN	C	7	5	X			X		X		X		X
305	1116	20.0%	INDANTHRENE GREEN BB PASTE	GEN	C	7	5	X		X		X		X			X
306	1116	5.0%	INDANTHRENE GREEN BB PASTE	GEN	C	7	5	X		X		X		X			X
307	-	20.0%	INDANTHRENE GOLD ORANGE 3G PASTE	GEN	C	7	5	X		X		X		X			X
308	-	5.0%	INDANTHRENE GOLD ORANGE 3G PASTE	GEN	C	7	5	X		X		X			X		X
309	1095	20.0%	ANTHRA YELLOW GC PASTE	GEN	C	7	2	X		X		X			X		X
310	1095	5.0%	ANTHRA YELLOW GC PASTE	GEN	C	7	2	X			X		X		X		X
311	1152	20.0%	INDANTHRENE BROWN G PASTE	GEN	C	7	5	X		X		X		X			X
312	1152	5.0%	INDANTHRENE BROWN G PASTE	GEN	C	7	5		X	X			X		X		X
313	-	20.0%	HYDRON BROWN G PASTE	GEN	C	7	5	X		X		X			X		X
314	-	5.0%	HYDRON BROWN G PASTE	GEN	C	7	3		X	X		X			XA		X
315	1136	20.0%	INDANTHRENE ORANGE 2RK PASTE	GEN	C	7	5	X		X			X		X		X
316	1136	5.0%	INDANTHRENE ORANGE 2RK PASTE	GEN	C	7	5	X		X			X		X		X
317	1131	20.0%	INDANTHRENE RED 5GK PASTE	GEN	C	7	5	X		X		X			X		X
318	1131	5.0%	INDANTHRENE RED 5GK PASTE	GEN	C	7	5	X		X		X			X		X
319	1132	20.0%	INDANTHRENE YELLOW GK PASTE	GEN	C	7	5	X		X			X		X		X
320	1132	5.0%	INDANTHRENE YELLOW GK PASTE	GEN	C	7	3		X		X		X		AX		X
321	1134	20.0%	INDANTHRENE BRIL.VIOLET BBK PASTE	GEN	C	7	5	X		X			X		X		X
322	1134	5.0%	INDANTHRENE BRIL. VIOLET BBK PASTE	GEN	C	7	5	X			X		X		X		X
323	-	20.0%	INDANTHRENE ORANGE 3R PASTE	GEN	C	7	5	X		X		X		X			X
324	-	5.0%	INDANTHRENE ORANGE 3R PASTE	GEN	C	7	5	X		X		X			X		X
325	-	20.0%	INDANTHRENE YELLOW RK PASTE	GEN	C	7	5	X		X		X			X		X
326	-	5.0%	INDANTHRENE YELLOW RK PASTE	GEN	C	7	5	X		X		X			X		X
327	1143	20.0%	ANTHRA BORDEAUX R PASTE	GEN	C	7	3		X		X		X		AX		X
328	1143	5.0%	ANTHRA BORDEAUX R PASTE	GEN	C	7	3		X		X		X		AX	X	
329	-	20.0%	INDANTHRENE RED GG PASTE	GEN	C	7	5	X		X		X		X			X
330	-	5.0%	INDANTHRENE RED GG PASTE	GEN	C	7	3	X		X		X			XA	X	
331	-	10.0%	INDANTHRENE PINK BDbl PASTE	GEN	C	7	5	X		X		X			X		X
332	-	2.5%	INDANTHRENE PINK BDbl PASTE	GEN	C	7	3		X	X		X			XA		X
333	1212	20.0%	INDANTHRENE RED VIOLET RH PASTE	GEN	C	7	3		X		X	X			XA		X
334	1212	5.0%	INDANTHRENE RED VIOLET RH PASTE	GEN	C	7	3		X		X	X			XA		X
335	1163	20.0%	INDANTHRENE VIOLET BN PASTE	GEN	C	7	5	X		X		X		X		X	
336	1163	5.0%	INDANTHRENE VIOLET BN PASTE	GEN	C	7	5		X	X			X		X		X
337	1162	20.0%	INDANTHRENE RED RK PASTE	GEN	C	7	5	X		X		X			X		X
338	1162	5.0%	INDANTHRENE RED RK PASTE	GEN	C	7	5	X		X		X			X		X
339	-	10.0%	INDANTHRENE BLUE GREEN BDbl PASTE	GEN	C	7	5	X		X			X	X			X
340	-	2.5%	INDANTHRENE BLUE GREEN BDbl PASTE	GEN	C	7	3	X		X		X			XB		X
341	1111	20.0%	INDANTHRENE BLUE 5G PASTE	GEN	C	7	5	X		X		X		X			X
342	1111	5.0%	INDANTHRENE BLUE 5G PASTE	GEN	C	7	5	X		X		X		X			X
343	-	-	NAPHTHOL ASBR + FAST SCARLET 2G SALT	GEN	C	10	3	X			X	X			XB		X
344	-	-	NAPHTHOL ASRL + FAST RED B SALT	GEN	C	10	5	X			X		X		X		X
345	-	-	NAPHTHOL ASRL + FAST RED RL BASE	GEN	C	10	5	X			X		X		X		X
346	-	LIGHT	NAPHTHOL ASRL + FAST RED RL BASE	GEN	C	10	3		X		X		X		AX		X
347	-	-	NAPHTHOL ASRL + FAST SCARLET 2G SALT	GEN	C	10	5	X			X		X		X		X
348	-	-	NAPHTHOL ASSW + FAST RED KB BASE	GEN	C	10	3		X		X		X		AX		X
349	-	-	NAPHTHOL ASG + FAST SCARLET 2G SALT	GEN	C	10	3		X		X		X		XA		X
350	-	-	NAPHTHOL ASBG + FAST SCARLET 2G SALT	GEN	C	10	5	X		X			X		X		X

TABLE 2—*Continued*

SERIAL NUMBER	COLOUR INDEX NUMBER	DYE AMOUNT	DYE NAME	DYE MANUFACTURER	FIBER	DYEING METHOD	GROUP	COMPARISON WITH SET A: SET B L = M	SET D L = M	SET E L = M	SET F L = M	SETS G & H L = M
704	1088	1.0%	ALIZARINE BLUE SKY	GEN	W	1	2	X	X	X	X	X
705	1088	0.2%	ALIZARINE BLUE SKY	GEN	W	1	2	X	X	X	X	X
706	1054	3.0%	ALIZARINE BLUE SAP NEW	GEN	W	1	2	X	X	X	X	X
707	1054	1.0%	ALIZARINE BLUE SAP NEW	GEN	W	1	2	X	X	X	X	X
708	1054	0.2%	ALIZARINE BLUE SAP NEW	GEN	W	1	2	X	X	X	X	X
709	1080	3.0%	ANTHRAQUINONE VIOLET	GEN	W	1	3	X	X	X	XB	X
710	1080	1.0%	ANTHRAQUINONE VIOLET	GEN	W	1	2	X	X	X	X	X
711	1080	0.2%	ANTHRAQUINONE VIOLET	GEN	W	1	2	X	X	X	X	X
712	1078	3.0%	ALIZARINE CYANINE GREEN G EX	GEN	W	1	2	X	X	X	X	X
713	1078	1.0%	ALIZARINE CYANINE GREEN G EX	GEN	W	1	2	X	X	X	X	X
714	1078	0.2%	ALIZARINE CYANINE GREEN G EX	GEN	W	1	2	X	X	X	X	X
715	1089	3.0%	ANTHRAQUINONE BLUE SR EX	GEN	W	1	2	X	X	X	X	X
716	1089	1.0%	ANTHRAQUINONE BLUE SR EX	GEN	W	1	2	X	X	X	X	X
717	1089	0.2%	ANTHRAQUINONE BLUE SR EX	GEN	W	1	2	X	X	X	X	X
718	640	5.0%	TARTRAZINE CONC	NA	W	1	5	X	X	X	X	X
719	640	1.0%	TARTRAZINE CONC	NA	W	1	3	X	X	X	XB	X
720	640	0.2%	TARTRAZINE CONC	NA	W	1	2	X	X	X	X	X
721	639	5.0%	XYLENE LIGHT YELLOW 2G	SAN	W	1	5	X	X	X	X	X
722	639	1.0%	XYLENE LIGHT YELLOW 2G	SAN	W	1	5	X	X	X	X	X
723	639	0.2%	XYLENE LIGHT YELLOW 2G	SAN	W	1	2	X	X	X	X	X
724	-	5.0%	MILLING YELLOW O	GEN	W	2	3	X	X	X	XB	X
725	-	1.0%	MILLING YELLOW O	GEN	W	2	2	X	X	X	X	X
726	-	0.2%	MILLING YELLOW O	GEN	W	2	1	X	X	X	X	X
727	636	5.0%	FAST LIGHT YELLOW 2G	GRAS	W	1	5	X	X	X	X	X
728	636	1.0%	FAST LIGHT YELLOW 2G	GRAS	W	1	2	X	X	X	X	X
729	636	0.2%	FAST LIGHT YELLOW 2G	GRAS	W	1	2	X	X	X	X	X
730	645	5.0%	KITON FAST YELLOW 3G	CIBA	W	1	5	X	X	X	X	X
731	645	1.0%	KITON FAST YELLOW 3G	CIBA	W	1	5	X	X	X	X	X
732	645	0.2%	KITON FAST YELLOW 3G	CIBA	W	1	2	X	X	X	X	X
733	-	5.0%	CLOTH FAST RED GR	CIBA	W	2	2	X	X	X	X	X
734	-	1.0%	CLOTH FAST RED GR	CIBA	W	2	2	X	X	X	X	X
735	-	0.2%	CLOTH FAST RED GR	CIBA	W	2	1	X	X	X	X	X
736	-	5.0%	KITON FAST RED BL	CIBA	W	1	5	X	X	X	X	X
737	-	1.0%	KITON FAST RED BL	CIBA	W	1	2	X	X	X	X	X
738	-	0.2%	KITON FAST RED BL	CIBA	W	1	2	X	X	X	X	X
739	179	5.0%	AZO RUBINE CONC	CIBA	W	1	5	X	X	X	X	X
740	179	1.0%	AZO RUBINE CONC	CIBA	W	1	2	X	X	X	X	X
741	179	0.2%	AZO RUBINE CONC	CIBA	W	1	1	X	X	X	X	X
742	692	5.0%	ACID MAGENTA CRYST	CIBA	W	1	2	X	X	X	X	X
743	692	1.0%	ACID MAGENTA CRYST	CIBA	W	1	1	X	X	X	X	X
744	692	0.2%	ACID MAGENTA CRYST	CIBA	W	1	1	X	X	X	X	X
745	-	5.0%	BENZYL FAST BLUE L	CIBA	W	2	2	X	X	X	X	X
746	-	1.0%	BENZYL FAST BLUE L	CIBA	W	2	2	X	X	X	X	X
747	-	0.2%	BENZYL FAST BLUE L	CIBA	W	2	1	X	X	X	X	X
748	1180	5.0%	INDIGOTINE CONC	CIBA	W	1	2	X	X	X	X	X
749	1180	1.0%	INDIGOTINE CONC	CIBA	W	1	1	X	X	X	X	X
750	1180	0.2%	INDIGOTINE CONC	CIBA	W	1	1	X	X	X	X	X
751	-	5.0%	NEOLAN BLUE 2G	CIBA	W	1	5	X	X	X	X	X
752	-	1.0%	NEOLAN BLUE 2G	CIBA	W	1	2	X	X	X	X	X
753	-	0.2%	NEOLAN BLUE 2G	CIBA	W	1	2	X	X	X	X	X
754	729	3.5%	VICTORIA BLUE B	CIBA	W	1	1	X	X	X	X	X
755	729	0.7%	VICTORIA BLUE B	CIBA	W	1	1	X	X	X	X	X
756	729	0.14%	VICTORIA BLUE B	CIBA	W	1	1	X	X	X	X	X
757	-	5.0%	INDOCYANINE B	GEN	W	2	4	X	X	X	X	X
758	-	1.0%	INDOCYANINE B	GEN	W	2	2	X	X	X	X	X
759	-	0.2%	INDOCYANINE B	GEN	W	2	2	X	X	X	X	X
760	208	5.0%	FAST WOOL BLUE R	NA	W	2	2	X	X	X	X	X
761	208	1.0%	FAST WOOL BLUE R	NA	W	2	2	X	X	X	X	X
762	208	0.2%	FAST WOOL BLUE R	NA	W	2	2	X	X	X	X	X
763	-	5.0%	BRILLIANT MILLING BLUE B	GEN	W	2	1	X	X	X	X	X
764	-	1.0%	BRILLIANT MILLING BLUE B	GEN	W	2	1	X	X	X	X	X
765	-	0.2%	BRILLIANT MILLING BLUE B	GEN	W	2	1	X	X	X	X	X
766	717	5.0%	ACID VIOLET 6BN	CIBA	W	1	1	X	X	X	X	X
767	717	1.0%	ACID VIOLET 6BN	CIBA	W	1	1	X	X	X	X	X
768	717	0.2%	ACID VIOLET 6BN	CIBA	W	1	1	X	X	X	X	X
769	712	5.0%	KITON PURE BLUE V	CIBA	W	1	1	X	X	X	X	X
770	712	1.0%	KITON PURE BLUE V	CIBA	W	1	1	X	X	X	X	X
771	712	0.2%	KITON PURE BLUE V	CIBA	W	1	1	X	X	X	X	X
772	246	5.0%	ACID BLUE BLACK 10B	CIBA	W	1	5	X	X	X	X	X
773	246	1.0%	ACID BLUE BLACK 10B	CIBA	W	1	2	X	X	X	X	X

TABLE 2—*Continued*

SERIAL NUMBER	COLOUR INDEX NUMBER	DYE AMOUNT	DYE NAME	DYE MANUFACTURER	FIBER	DYEING METHOD	GROUP	COMPARISON WITH SET A: SET B L = M	SET D L = M	SET E L = M	SET F L = M	SETS G & H L = M
564	-	4.0%	CHROMATE BRILLIANT BROWN R	CHEM	W	6	2	X	X	X	X	X
565	-	2.0%	CHROMATE BRILLIANT BROWN R	CHEM	W	6	2	X	X	X	X	X
566	-	1.0%	CHROMATE BRILLIANT BROWN R	CHEM	W	6	2	X	X	X	X	X
567	-	0.5%	CHROMATE BRILLIANT BROWN R	CHEM	W	6	2	X	X	X	X	X
568	169	2.0%	PONTACHROME VIOLET SW	DP	W	4	3	X	X	X	XB	X
569	169	1.0%	PONTACHROME VIOLET SW	DP	W	4	3	X	X	X	XB	X
570	169	0.5%	PONTACHROME VIOLET SW	DP	W	4	2	X	X	X	X	X
571	-	2.0%	NAPHTHOCHROME VIOLET R	CIBA	W	5	2	X	X	X	X	X
572	-	1.0%	NAPHTHOCHROME VIOLET R	CIBA	W	5	2	X	X	X	X	X
573	-	0.5%	NAPHTHOCHROME VIOLET R	CIBA	W	5	2	X	X	X	X	X
574	180	2.0%	SERICHROME BLUE R	NA	W	4	2	X	X	X	X	X
575	180	1.0%	SERICHROME BLUE R	NA	W	4	2	X	X	X	X	X
576	180	0.5%	SERICHROME BLUE R	NA	W	4	1	X	X	X	X	X
577	883	2.0%	CHROME BLUE GCB	NA	W	5	2	X	X	X	X	X
578	883	1.0%	CHROME BLUE GCB	NA	W	5	1	X	X	X	X	X
579	883	0.5%	CHROME BLUE GCB	NA	W	5	1	X	X	X	X	X
580	931	2.0%	BRILLIANT ALIZARINE BLUE GA	GEN	W	5	2	X	X	X	X	X
581	931	1.0%	BRILLIANT ALIZARINE BLUE GA	GEN	W	5	2	X	X	X	X	X
582	931	0.5%	BRILLIANT ALIZARINE BLUE GA	GEN	W	5	2	X	X	X	X	X
583	-	2.0%	SERICHROME GREEN B	NA	W	4	2	X	X	X	X	X
584	-	1.0%	SERICHROME GREEN B	NA	W	4	1	X	X	X	X	X
585	-	0.5%	SERICHROME GREEN B	NA	W	4	1	X	X	X	X	X
586	36	1.0%	ALIZARINE YELLOW 2G	GEN	W	5	3	X	X	X	XB	X
587	36	0.5%	ALIZARINE YELLOW 2G	GEN	W	5	2	X	X	X	X	X
588	36	0.25%	ALIZARINE YELLOW 2G	GEN	W	5	2	X	X	X	X	X
589	195	1.0%	SUPERCHROME YELLOW GN	NA	W	4	2	X	X	X	X	X
590	195	0.5%	SUPERCHROME YELLOW GN	NA	W	4	2	X	X	X	X	X
591	195	0.25%	SUPERCHROME YELLOW GN	NA	W	4	2	X	X	X	X	X
592	110	0.5%	DIAMOND FLAVINE GA	GEN	W	4	3	X	X	X	BX	X
593	110	0.25%	DIAMOND FLAVINE GA	GEN	W	4	2	X	X	X	X	X
594	110	0.125%	DIAMOND FLAVINE GA	GEN	W	4	2	X	X	X	X	X
595	40	1.0%	PONTACHROME YELLOW 3R	DP	W	5	3	X	X	X	XB	X
596	40	0.5%	PONTACHROME YELLOW 3R	DP	W	5	2	X	X	X	X	X
597	40	0.25%	PONTACHROME YELLOW 3R	DP	W	5	2	X	X	X	X	X
598	216	2.0%	SUPERCHROME RED B	NA	W	4	5	X	X	X	X	X
599	216	1.0%	SUPERCHROME RED B	NA	W	4	3	X	X	X	XB	X
600	216	0.5%	SUPERCHROME RED B	NA	W	4	2	X	X	X	X	X
601	696	5.0%	PONTACYL FAST VIOLET 10B	DP	W	1	1	X	X	X	X	X
602	696	1.0%	PONTACYL FAST VIOLET 10B	DP	W	1	1	X	X	X	X	X
603	696	0.2%	PONTACYL FAST VIOLET 10B	DP	W	1	1	X	X	X	X	X
604	487	5.0%	ACID ANTHRACENE RED 3BM	GARF	W	2	1	X	X	X	X	X
605	487	1.0%	ACID ANTHRACENE RED 3BM	GARF	W	2	1	X	X	X	X	X
606	487	0.2%	ACID ANTHRACENE RED 3BM	GARF	W	2	1	X	X	X	X	X
607	5	5.0%	ACID GREEN O	CAL	W	1	5	X	X	X	X	X
608	5	1.0%	ACID GREEN O	CAL	W	1	3	X	X	X	XB	X
609	5	0.2%	ACID GREEN O	CAL	W	1	3	X	X	X	XB	X
610	302	5.0%	AUTOCHROME GREEN BB	CAMP	W	2	3	X	X	X	BX	X
611	302	1.0%	AUTOCHROME GREEN BB	CAMP	W	2	2	X	X	X	X	X
612	302	0.2%	AUTOCHROME GREEN BB	CAMP	W	2	1	X	X	X	X	X
613	415	5.0%	PONTAMINE ORANGE R	DP	W	3	3	X	X	X	XB	X
614	415	1.0%	PONTAMINE ORANGE R	DP	W	3	2	X	X	X	X	X
615	415	0.2%	PONTAMINE ORANGE R	DP	W	3	1	X	X	X	X	X
616	431	0.2%	CHROME RED A4B	NEW	W	2	1	X	X	X	X	X
617	431	1.0%	CHROME RED A4B	NEW	W	2	2	X	X	X	X	X
618	431	5.0%	CHROME RED A4B	NEW	W	2	3	X	X	X	XB	X
619	63	5.0%	VICTORIA VIOLET 4BS	NEW	W	1	3	X	X	X	XB	X
620	63	1.0%	VICTORIA VIOLET 4BS	NEW	W	1	1	X	X	X	X	X
621	63	0.2%	VICTORIA VIOLET 4BS	NEW	W	1	1	X	X	X	X	X
622	234	5.0%	RESORCIN BROWN Y	CAL	W	2	1	X	X	X	X	X
623	234	1.0%	RESORCIN BROWN Y	CAL	W	2	1	X	X	X	X	X
624	234	0.2%	RESORCIN BROWN Y	CAL	W	2	1	X	X	X	X	X
625	289	5.0%	SULFONCYANINE 5R EX	CAL	W	2	5	X	X	X	X	X
626	289	1.0%	SULFONCYANINE 5R EX	CAL	W	2	2	X	X	X	X	X
627	289	0.2%	SULFONCYANINE 5R EX	CAL	W	2	2	X	X	X	X	X
628	698	5.0%	ACID VIOLET 4BX	CAL	W	2	1	X	X	X	X	X
629	698	1.0%	ACID VIOLET 4BX	CAL	W	2	1	X	X	X	X	X
630	698	0.2%	ACID VIOLET 4BX	CAL	W	2	1	X	X	X	X	X
631	814	5.0%	DIRECT FAST YELLOW NN	CAL	W	3	5	X	X	X	X	X
632	814	1.0%	DIRECT FAST YELLOW NN	CAL	W	3	5	X	X	X	X	X
633	814	0.2%	DIRECT FAST YELLOW NN	CAL	W	3	3	X	X	X	XB	X

TABLE 2—*Continued*

SERIAL NUMBER	COLOUR INDEX NUMBER	AMOUNT	DYE NAME	MANUFACTURER	FIBER	DYEING METHOD	GROUP	COMPARISON WITH SET A										SETS G & H	
								SET B		SET D		SET E		SET F					
								L =	M	L =	M	L =	M	L =	M			L =	M
71	-	2.0%	LIGHT FAST BROWN 3YL	NEW	S	3	2		X		X		X		X				X
72	-	0.5%	LIGHT FAST BROWN 3YL	NEW	S	3	2		X		X		X		X				X
73	-	2.0%	DIRECT FAST BLUE SFF	NEW	S	3	2		X		X		X		X				X
74	-	0.5%	DIRECT FAST BLUE SFF	NEW	S	3	2		X		X		X		X				X
75	-	2.0%	DIRECT FAST BLACK LR	NEW	S	3	1		X		X		X		X				X
76	-	0.5%	DIRECT FAST BLACK LR	NEW	S	3	1		X		X		X		X				X
77	278	2.0%	DIRECT FAST RED 8BL	NEW	S	3	3		X		X		X		XB				X
78	278	0.5%	DIRECT FAST RED 8BL	NEW	S	3	2		X		X		X		X				X
79	814	2.0%	DIRECT FAST YELLOW NN	NEW	S	3	5		X		X		X		X				X
80	814	0.5%	DIRECT FAST YELLOW NN	NEW	S	3	2		X		X		X		X				X
81	512	2.0%	DIRECT FAST BLUE RW	NEW	S	3	1		X		X		X		X			X	
82	512	0.5%	DIRECT FAST BLUE RW	NEW	S	3	1		X		X		X		X			X	
83	448	2.0%	BENZOPURPURINE 4B	NEW	S	3	2		X		X		X		X				X
84	448	0.5%	BENZOPURPURINE 4B	NEW	S	3	1		X		X		X		X				X
85	520	2.0%	DIRECT SKY BLUE	NEW	S	3	1		X		X		X		X				X
86	520	0.5%	DIRECT SKY BLUE	NEW	S	3	1		X		X		X		X				X
87	518	2.0%	DIRECT SKY BLUE 6B CONC	NEW	S	3	1		X		X		X		X				X
88	518	0.5%	DIRECT SKY BLUE 6B CONC	NEW	S	3	1		X		X		X		X				X
89	477	2.0%	DIRECT BLUE 3B CONC	NEW	S	3	1		X		X		X		X				X
90	477	0.5%	DIRECT BLUE 3B CONC	NEW	S	3	1		X		X		X		X				X
91	415	0.5%	DIRECT ORANGE R	NEW	S	3	2		X		X		X		X				X
92	415	2.0%	DIRECT ORANGE R	NEW	S	3	2		X		X		X		X				X
93	420	2.0%	DIRECT FAST BROWN M	NEW	S	3	1		X		X		X		X				X
94	420	0.5%	DIRECT FAST BROWN M	NEW	S	3	1		X		X		X		X				X
95	406	2.0%	DIRECT BLUE 2B CONC	NEW	S	3	1		X		X		X		X				X
96	406	0.5%	DIRECT BLUE 2B CONC	NEW	S	3	1		X		X		X		X				X
97	394	2.0%	DIRECT VIOLET N	NEW	S	3	2		X		X		X		X				X
98	394	0.5%	DIRECT VIOLET N	NEW	S	3	2		X		X		X		X				X
99	126	2.0%	DIRECT FAST PINK E2GN	NEW	S	3	2		X		X		X		X				X
100	126	0.5%	DIRECT FAST PINK E2GN	NEW	S	3	2		X		X		X		X				X
101	-	2.0%	LIGHT FAST BROWN 3YL	NEW	C	1	2		X		X		X		X				X
102	-	0.5%	LIGHT FAST BROWN 3YL	NEW	C	1	2		X		X		X		X				X
103	621	2.0%	DIRECT ORANGE 2R	NEW	C	1	1		X		X		X		X				X
104	621	0.5%	DIRECT ORANGE 2R	NEW	C	1	1		X		X		X		X				X
105	478	2.0%	ERIE ORANGE Y	NA	C	1	1		X			X		X		X			X
106	478	0.5%	ERIE ORANGE Y	NA	C	1	1		X			X		X		X			X
107	-	2.0%	CHLORAMINE FAST ORANGE ER	GARF	C	1	1		X			X		X		X			X
108	-	0.5%	CHLORAMINE FAST ORANGE ER	GARF	C	1	1		X			X		X		X			X
109	415	2.0%	PONTAMINE ORANGE R	DP	C	1	2		X		X			X		X			X
110	415	0.5%	PONTAMINE ORANGE R	DP	C	1	2		X		X			X		X			X
111	127	0.5%	GERANINE GL	DP	C	1	2		X		X			X		X			X
112	127	2.0%	GERANINE GL	DP	C	1	2		X		X			X		X			X
113	561	0.5%	TRISULPHON BROWN B	SAN	C	1	1		X		X			X		X			X
114	561	2.0%	TRISULPHON BROWN B	SAN	C	1	1		X			X		X		X			X
115	598	2.0%	ERIE FAST BROWN GR	NA	C	1	1		X			X		X		X			X
116	598	0.5%	ERIE FAST BROWN GR	NA	C	1	1		X		X			X		X			X
117	382	0.5%	ERIE SCARLET 3B	NA	C	1	1		X			X			X		X		X
118	382	2.0%	ERIE SCARLET 3B	NA	C	1	1		X			X			X		X		X
119	581	0.5%	PONTAMINE BLACK EX CONC	DP	C	1	1		X			X			X		X		X
120	581	5.0%	PONTAMINE BLACK EX CONC	DP	C	1	1		X			X		X			X		X
121	448	0.5%	PURPURINE 4B CONC	DP	C	1	1		X			X			X		X	X	
122	448	2.0%	PURPURINE 4B CONC	DP	C	1	1		X			X			X		X		X
123	410	2.0%	DIRECT YELLOW 4GC	NEW	C	1	2		X		X			X		X			X
124	410	0.5%	DIRECT YELLOW 4GC	NEW	C	1	2		X		X			X		X			X
125	813	0.5%	DIRECT PURE YELLOW M	NEW	C	1	1		X			X			X		X		X
126	813	2.0%	DIRECT PURE YELLOW M	NEW	C	1	1		X			X			X				X
127	130	0.5%	DIRECT FAST PINK EB EX	NEW	C	1	1		X			X			X		X		X
128	130	2.0%	DIRECT FAST PINK EB EX	NEW	C	1	1		X			X			X				X
129	576	2.0%	SOLANTINE BLUE 4GL	NA	C	1	2		X		X			X		X			X
130	576	0.5%	SOLANTINE BLUE 4GL	NA	C	1	2		X		X			X		X			X
131	326	2.0%	PONTAMINE FAST ORANGE S	DP	C	1	2		X			X			X				X
132	326	0.5%	PONTAMINE FAST ORANGE S	DP	C	1	2		X			X			X				X
133	518	1.0%	DIRECT SKY BLUE 6B CONC	NEW	C	6	3		X			X			X	A			X
134	518	0.25%	DIRECT SKY BLUE 6B CONC	NEW	C	6	3		X			X			X	A			X
135	518	1.0%	DIRECT SKY BLUE 6B CONC	NEW	C	1	1		X			X			X		X	X	
136	518	0.25%	DIRECT SKY BLUE 6B CONC	NEW	C	1	1		X			X			X		X	X	
137	-	1.0%	PONTAMINE COPPER BLUE RRX	DP	C	6	2		X		X			X		X			X
138	-	0.25%	PONTAMINE COPPER BLUE RRX	DP	C	6	2		X		X			X		X			X
139	-	1.0%	PONTAMINE COPPER BLUE RRX	DP	C	1	1		X			X			X		X		X
140	-	0.25%	PONTAMINE COPPER BLUE RRX	DP	C	1	1		X		X			X		X			X

TABLE 2—*Continued*

SERIAL NUMBER	COLOUR INDEX NUMBER	DYE AMOUNT	DYE NAME	MANUFACTURER	FIBER	DYEING METHOD	GROUP	COMPARISON WITH SET A: SET B L = M	SET D L = M	SET E L = M	SET F L = M	SETS G & H L = M
1	-	0.5%	DIAZO BRILLIANT SCARLET 2BL EX CONC	GEN	C	2	1	X	X	X	X	X
2	-	2.0%	DIAZO BRILLIANT SCARLET 2BL EX CONC	GEN	C	2	1	X	X	X	X	X
3	-	0.5%	PONTAMINE DIAZO RED 7BL	DP	C	2	1	X	X	X	X	X
4	-	2.0%	PONTAMINE DIAZO RED 7BL	DP	C	2	1	X	X	X	X	X
5	324A	0.5%	PONTAMINE DIAZO SCARLET R	DP	C	2	1	X	X	X	X	X
6	324A	2.0%	PONTAMINE DIAZO SCARLET R	DP	C	2	1	X	X	X	X	X
7	-	0.5%	DIAZANIL SCARLET 6BA	GEN	C	2	1	X	X	X	X	X
8	-	2.0%	DIAZANIL SCARLET 6BA	GEN	C	2	1	X	X	X	X	X
9	324A	0.5%	ROSANTHRENE BORDEAUX B	CIBA	C	2	1	X	X	X	X	X
10	324A	2.0%	ROSANTHRENE BORDEAUX B	CIBA	C	2	1	X	X	X	X	X
11	812	1.0%	PRIMULINE NAC	NA	C	2	1	X	X	X	X	X
12	812	4.0%	PRIMULINE NAC	NA	C	2	1	X	X	X	X	X
13	-	0.5%	DIAZYL VIOLET BL	DH	C	2	1	X	X	X	X	X
14	-	2.0%	DIAZYL VIOLET BL	DH	C	2	1	X	X	X	X	X
15	-	0.5%	DIAZO INDIGO BLUE 4GL EX	GEN	C	2	3	X	X	X	XA	X
16	-	2.0%	DIAZO INDIGO BLUE 4GL EX	GEN	C	2	3	X	X	X	XA	X
17	-	0.5%	DIAZO FAST BLUE 6GW	GEN	C	2	2	X	X	X	X	X
18	-	2.0%	DIAZO FAST BLUE 6GW	GEN	C	2	2	X	X	X	X	X
19	316	0.5%	DIAZO INDIGO BLUE 2RL	GEN	C	2	2	X	X	X	X	X
20	316	2.0%	DIAZO INDIGO BLUE 2RL	GEN	C	2	3	X	X	X	XA	X
21	317	0.5%	PONTAMINE DIAZO BLUE M	DP	C	2	2	X	X	X	X	X
22	317	2.0%	PONTAMINE DIAZO BLUE M	DP	C	2	2	X	X	X	X	X
23	-	0.5%	DIAZO BRILLIANT GREEN 3G	GEN	C	3	1	X	X	X	X	X
24	-	2.0%	DIAZO BRILLIANT GREEN 3G	GEN	C	3	1	X	X	X	X	X
25	654	0.5%	DIAZO FAST YELLOW 2G	GEN	C	3	1	X	X	X	X	X
26	654	2.0%	DIAZO FAST YELLOW 2G	GEN	C	3	1	X	X	X	X	X
27	812	1.0%	PRIMULINE NAC	NA	C	4	2	X	X	X	X	X
28	812	4.0%	PRIMULINE NAC	NA	C	4	3	X	X	X	AX	X
29	-	0.5%	ROSANTHRENE ORANGE R	CIBA	C	3	1	X	X	X	X	X
30	-	2.0%	ROSANTHRENE ORANGE R	CIBA	C	3	1	X	X	X	X	X
31	-	0.5%	ROSANTHRENE ORANGE R	CIBA	C	2	1	X	X	X	X	X
32	-	2.0%	ROSANTHRENE ORANGE R	CIBA	C	2	1	X	X	X	X	X
33	-	0.5%	PONTAMINE DIAZO ORANGE	DP	C	2	1	X	X	X	X	X
34	-	2.0%	PONTAMINE DIAZO ORANGE	DP	C	2	1	X	X	X	X	X
35	-	0.5%	PONTAMINE DIAZO BROWN 6G	DP	C	2	1	X	X	X	X	X
36	-	2.0%	PONTAMINE DIAZO BROWN 6G	DP	C	2	1	X	X	X	X	X
37	401	0.5%	DIAZINE BLACK H EXTRA	NA	C	2	1	X	X	X	X	X
38	401	2.0%	DIAZINE BLACK H EXTRA	NA	C	2	1	X	X	X	X	X
39	401	0.5%	DIAZINE BLACK H EXTRA	NA	C	5	1	X	X	X	X	X
40	401	2.0%	DIAZINE BLACK H EXTRA	NA	C	5	1	X	X	X	X	X
41	-	0.5%	DIAZINE BLACK V	NA	C	2	1	X	X	X	X	X
42	-	2.0%	DIAZINE BLACK V	NA	C	2	1	X	X	X	X	X
43	-	0.5%	DIAZINE BLACK V	NA	C	5	1	X	X	X	X	X
44	-	2.0%	DIAZINE BLACK V	NA	C	5	1	X	X	X	X	X
45	401	0.5%	DIAZINE BLACK H EXTRA	NA	C	1	1	X	X	X	X	X
46	401	2.0%	DIAZINE BLACK H EXTRA	NA	C	1	1	X	X	X	X	X
47	-	0.5%	PONTAMINE FAST BLACK LN	DP	C	1	1	X	X	X	X	X
48	-	2.0%	PONTAMINE FAST BLACK LN	DP	C	1	1	X	X	X	X	X
49	-	0.5%	SOLANTINE VIOLET R	NA	C	1	3	X	X	X	XA	X
50	-	2.0%	SOLANTINE VIOLET R	NA	C	1	2	X	X	X	X	X
51	179	2.0%	AZO RUBINE R	NEW	S	1	2	X	X	X	X	X
52	179	0.5%	AZO RUBINE R	NEW	S	1	2	X	X	X	X	X
53	-	2.0%	FAST ORANGE FSW	NEW	S	1	2	X	X	X	X	X
54	-	0.5%	FAST ORANGE FSW	NEW	S	1	2	X	X	X	X	X
55	29	2.0%	ACID PHLOXINE G	NEW	S	1	2	X	X	X	X	X
56	29	0.5%	ACID PHLOXINE G	NEW	S	1	2	X	X	X	X	X
57	79	2.0%	ACID SCARLET 2R	NEW	S	1	2	X	X	X	X	X
58	79	0.5%	ACID SCARLET 2R	NEW	S	1	2	X	X	X	X	X
59	419	2.0%	DIRECT FAST RED F	NEW	S	3	3	X	X	X	XB	X
60	419	0.5%	DIRECT FAST RED F	NEW	S	3	3	X	X	X	XB	X
61	598	2.0%	DIRECT BROWN GRN	NEW	S	3	1	X	X	X	X	X
62	598	0.5%	DIRECT BROWN GRN	NEW	S	3	1	X	X	X	X	X
63	581	5.0%	DIRECT BLACK EG 200%	NEW	S	3	1	X	X	X	X	X
64	581	1.0%	DIRECT BLACK EG 200%	NEW	S	3	1	X	X	X	X	X
65	576	2.0%	DIRECT FAST BLUE 4GL	NEW	S	3	1	X	X	X	X	X
66	576	0.5%	DIRECT FAST BLUE 4GL	NEW	S	3	1	X	X	X	X	X
67	594	2.0%	DIRECT GREEN MTL	NEW	S	3	1	X	X	X	X	X
68	594	0.5%	DIRECT GREEN MTL	NEW	S	3	1	X	X	X	X	X
69	593	2.0%	DIRECT GREEN B	NEW	S	3	1	X	X	X	X	X
70	593	0.5%	DIRECT GREEN B	NEW	S	3	1	X	X	X	X	X

TABLE 2—*Continued*

SERIAL NUMBER	COLOUR INDEX NUMBER	DYE AMOUNT	DYE NAME	DYE MANUFACTURER	FIBER	DYEING METHOD	GROUP	COMPARISON WITH SET A: SET B L	SET B M	SET D L	SET D M	SET E L	SET E M	SET F L	SET F M	SETS G & H L	SETS G & H M
491	-	2.0%	BENZO FAST BLUE 8GL	GEN	S	3	2		X	X		X		X		X	
492	-	0.5%	BENZO FAST BLUE 8GL	GEN	S	3	2		X	X		X		X		X	
493	-	4.0%	PONTAMINE DIAZO RED 7BL	DP	S	7	1	X		X			X		X		X
494	-	4.0%	DIAZO BRILLIANT GREEN 3G	GEN	S	8	2		X		X		X		X		X
495	-	4.0%	DIAZO INDIGO BLUE 4GL EX	GEN	S	7	2		X		X		X		X		X
496	324A	4.0%	ROSANTHRENE BORDEAUX B	CIBA	S	7	2	X		X			X		X		X
497	-	4.0%	DIAZANIL SCARLET 6BA	GEN	S	7	2		X		X		X		X		X
498	-	4.0%	ROSANTHRENE ORANGE R	CIBA	S	8	1		X		X		X	X			X
499	324A	4.0%	PONTAMINE DIAZO SCARLET R	DP	S	7	2	X			X		X		X		X
500	-	4.0%	PONTAMINE DIAZO ORANGE	DP	S	7	2		X		X		X		X		X
501	1134	5.0%	INDANTHRENE BRILLIANT VIOLET BBK PDR	GEN	S	6	5		X		X		X		X		X
502	1134	0.5%	INDANTHRENE BRILLIANT VIOLET BBK PDR	GEN	S	6	2		X	X			X	X			X
503	1186	5.0%	INDIGO MLB/6B PDR	GEN	S	6	2		X		X		X		X		X
504	1186	0.5%	INDIGO MLB/6B PDR	GEN	S	6	1		X	X		X			X		X
505	1113	20.0%	PONSOL BLUE GD DBL PDR	DP	S	6	5		X		X		X		X		X
506	1113	2.0%	PONSOL BLUE GD DBL PDR	DP	S	6	2		X	X			X	X			X
507	1111	5.0%	INDANTHRENE BLUE 5G PDR	GEN	S	6	5		X		X		X		X		X
508	1111	0.5%	INDANTHRENE BLUE 5G PDR	GEN	S	6	2		X	X			X	X			X
509	-	5.0%	HYDRON BROWN G PDR	GEN	S	6	5		X		X		X		X		X
510	-	0.5%	HYDRON BROWN G PDR	GEN	S	6	3		X		X		X		XA		X
511	1101	40.0%	ANTHRENE JADE GREEN 40%	NEW	S	6	2		X		X		X		X		X
512	1101	4.0%	ANTHRENE JADE GREEN 40%	NEW	S	6	2		X		X		X	X			X
513	1161	20.0%	PONSOL RED VIOLET RRNX PASTE	DP	S	6	1		X		X		X		X		X
514	1161	2.0%	PONSOL RED VIOLET RRNX PASTE	DP	S	6	1		X		X		X		X		X
515	1184	5.0%	CIBA BLUE 2B PDR	CIBA	S	6	2		X		X		X		X		X
516	1184	0.5%	CIBA BLUE 2B PDR	CIBA	S	6	1		X		X		X		X		X
517	1095	5.0%	ANTHRA YELLOW GC PDR	GEN	S	6	4	X			X		X		X		X
518	1095	0.5%	ANTHRA YELLOW GC PDR	GEN	S	6	3		X		X		X		XB		X
519	-	5.0%	CIBANON ORANGE 6R PDR	CIBA	S	6	3		X		X		X		XB		X
520	-	0.5%	CIBANON ORANGE 6R PDR	CIBA	S	6	1		X		X		X		X		X
521	1118	20.0%	PONSOL YELLOW G DBL PDR	DP	S	6	2	X			X		X		X		X
522	1118	2.0%	PONSOL YELLOW G DBL PDR	DP	S	6	1		X		X		X		X		X
523	1102	10.0%	PONSOL GREEN BN PASTE	DP	S	6	2		X		X		X		X		X
524	1102	1.0%	PONSOL GREEN BN PASTE	DP	S	6	2		X		X		X		X		X
525	1099	10.0%	ANTHRENE DARK BLUE BO 25%	NEW	S	6	2		X		X		X		X		X
526	1099	1.0%	ANTHRENE DARK BLUE BO 25%	NEW	S	6	1		X	X			X	X			X
527	969	5.0%	HYDRON BLUE R PDR	GEN	S	6	2		X		X		X		X		X
528	969	0.5%	HYDRON BLUE R PDR	GEN	S	6	1		X	X			X		X		X
529	1212	5.0%	INDANTHRENE RED VIOLET RH PDR	GEN	S	6	3		X		X		X		XB		X
530	1212	0.5%	INDANTHRENE RED VIOLET RH PDR	GEN	S	6	1		X		X		X		X		X
531	1217	5.0%	HELINDONE ORANGE R PDR	GEN	S	6	2	X			X		X		X		X
532	1217	0.5%	HELINDONE ORANGE R PDR	GEN	S	6	1	X		X			X	X			X
533	1226	10.0%	CIBA RED G PDR	CIBA	S	6	3		X		X		X		XA		X
534	1226	1.0%	CIBA RED G PDR	CIBA	S	6	3		X		X		X		XA		X
535	978	10.0%	SULPHUR BLACK R EX CONC	NA	S	6	2		X	X			X	X			X
536	978	1.0%	SULPHUR BLACK R EX CONC	NA	S	6	2		X		X		X	X			X
537	-	10.0%	INDANTHRENE GRAY 3B DBL PASTE	GEN	S	6	2		X		X		X		X		X
538	-	1.0%	INDANTHRENE GRAY 3B DBL PASTE	GEN	S	6	2		X	X			X		X		X
539	1102	25.0%	PONSOL BLACK B CONC PDR	DP	S	10	2		X	X			X		X		X
540	336	8.0%	ANTHRANOL FAST BLACK SE	US	W	4	5		X		X		X		X		X
541	336	4.0%	ANTHRANOL FAST BLACK SE	US	W	4	5		X		X		X		X		X
542	336	2.0%	ANTHRANOL FAST BLACK SE	US	W	4	3		X		X		X		XB		X
546	170	8.0%	DIAMOND BLACK PV	GEN	W	4	5		X		X		X	X			X
547	170	4.0%	DIAMOND BLACK PV	GEN	W	4	2		X	X			X		X		X
548	170	2.0%	DIAMOND BLACK PV	GEN	W	4	2		X		X		X		X		X
549	-	2.0%	ANTHRACENE CHROMATE BROWN EB	GEN	W	6	3		X		X		X		XB		X
550	-	1.0%	ANTHRACENE CHROMATE BROWN EB	GEN	W	6	2		X		X		X		X		X
551	-	0.5%	ANTHRACENE CHROMATE BROWN EB	GEN	W	6	2		X		X		X		X		X
552	167	2.0%	ACID ANTHRACENE BROWN B	GEN	W	4	3		X	X			X		XB		X
553	167	1.0%	ACID ANTHRACENE BROWN B	GEN	W	4	3		X		X		X		XB		X
554	167	0.5%	ACID ANTHRACENE BROWN B	GEN	W	4	2		X		X		X		X		X
555	-	2.0%	ACID ANTHRACENE BROWN RHA	GEN	W	5	2		X	X			X		X		X
556	-	1.0%	ACID ANTHRACENE BROWN RHA	GEN	W	5	2		X	X			X		X		X
557	-	0.5%	ACID ANTHRACENE BROWN RHA	GEN	W	5	2		X	X			X		X		X
558	101	2.0%	ALIZARINE BROWN B	CAL	W	5	3		X		X		X		XB		X
559	101	1.0%	ALIZARINE BROWN B	CAL	W	5	2		X		X		X		X		X
560	101	0.5%	ALIZARINE BROWN B	CAL	W	5	2		X		X		X	X			X
561	-	2.0%	ACID ANTHRACENE BROWN PG	GEN	W	5	2		X		X		X		X		X
562	-	1.0%	ACID ANTHRACENE BROWN PG	GEN	W	5	2		X		X		X		X		X
563	-	0.5%	ACID ANTHRACENE BROWN PG	GEN	W	5	2		X		X		X		X		X

TABLE 2—*Continued*

SERIAL NUMBER	COLOUR INDEX NUMBER	DYE AMOUNT	DYE NAME	DYE MANUFACTURER	FIBER	DYEING METHOD	GROUP	COMPARISON WITH SET A: SET B L = M	SET D L = M	SET E L = M	SET F L = M	SETS G & H L = M
351	-	-	NAPHTHOL ASRL + FAST RED GL SALT	GEN	C	10	5	X	X	X	X	X
352	-	-	NAPHTHOL ASRL + FAST SCARLET G BASE	GEN	C	10	5	X	X	X	X	X
353	-	-	NAPHTHOL AS + FAST RED 3GL SALT	GEN	C	10	5	X	X	X	X	X
354	1207	40.0%	THIOINDIGO RED B PASTE	GEN	C	7	3	X	X	X	XB	X
355	1207	10.0%	THIOINDIGO RED B PASTE	GEN	C	7	2	X	X	X	X	X
356	1189	10.0%	BRILLIANT INDIGO 4G PDR	GEN	C	7	1	X	X	X	X	X
357	1189	2.5%	BRILLIANT INDIGO 4G PDR	GEN	C	7	1	X	X	X	X	X
358	1177	-	INDIGO - HEAVY	DP	C	7	1	X	X	X	X	X
359	1177	-	INDIGO - MEDIUM	DP	C	7	1	X	X	X	X	X
360	1178	-	INDIGOSOL O - LIGHT	DH	C	12	1	X	X	X	X	X
361	707	2.0%	SOLUBLE BLUE 2G	DAV	S	1	1	X	X	X	X	X
362	707	0.5%	SOLUBLE BLUE 2G	DAV	S	1	1	X	X	X	X	X
363	696	2.0%	PONTACYL FAST VIOLET 10B	DP	S	1	1	X	X	X	X	X
364	696	0.5%	PONTACYL FAST VIOLET 10B	DP	S	1	1	X	X	X	X	X
365	661	2.0%	TURQUOISE BLUE GM	GARF	S	1	1	X	X	X	X	X
366	661	0.5%	TURQUOISE BLUE GM	GARF	S	1	1	X	X	X	X	X
367	289	2.0%	PONTACYL FAST BLUE 5R CONC	DP	S	3	2	X	X	X	X	X
368	289	0.5%	PONTACYL FAST BLUE 5R CONC	DP	S	3	2	X	X	X	X	X
369	246	5.0%	PONTACYL BLUE BLACK SX	DP	S	1	3	X	X	X	XB	X
370	307	5.0%	PONTACYL FAST BLACK BBO	DP	S	1	3	X	X	X	BX	X
371	32	2.0%	BRILLIANT ANTHRACENE RED 5BL	GARF	S	1	2	X	X	X	X	X
372	32	0.5%	BRILLIANT ANTHRACENE RED 5BL	GARF	S	1	2	X	X	X	X	X
373	185	2.0%	SCARLET 4R	CAL	S	1	1	X	X	X	X	X
374	185	0.5%	SCARLET 4R	CAL	S	1	1	X	X	X	X	X
375	176	2.0%	FAST RED A	GEN	S	1	1	X	X	X	X	X
376	176	0.5%	FAST RED A	GEN	S	1	1	X	X	X	X	X
377	154	2.0%	AZOFUCHSINE 6B	GEN	S	1	1	X	X	X	X	X
378	154	0.5%	AZOFUCHSINE 6B	GEN	S	1	1	X	X	X	X	X
379	16	2.0%	PONTACYL FAST YELLOW G	DP	S	1	2	X	X	X	X	X
380	16	0.5%	PONTACYL FAST YELLOW G	DP	S	1	2	X	X	X	X	X
381	138	2.0%	METANIL YELLOW CONC	DP	S	1	2	X	X	X	X	X
382	138	0.5%	METANIL YELLOW CONC	DP	S	1	2	X	X	X	X	X
383	31	2.0%	PONTACYL CARMINE 2G	DP	S	1	2	X	X	X	X	X
384	31	0.5%	PONTACYL CARMINE 2G	DP	S	1	2	X	X	X	X	X
385	640	2.0%	TARTRAZINE XXX CONC	PHAR	S	1	2	X	X	X	X	X
386	640	0.5%	TARTRAZINE XXX CONC	PHAR	S	1	2	X	X	X	X	X
387	639	2.0%	XYLENE LIGHT YELLOW 2G	SAN	S	1	5	X	X	X	X	X
388	639	0.5%	XYLENE LIGHT YELLOW 2G	SAN	S	1	2	X	X	X	X	X
389	636	2.0%	PONTACYL LIGHT YELLOW 2G	DP	S	1	3	X	X	X	XB	X
390	636	0.5%	PONTACYL LIGHT YELLOW 2G	DP	S	1	2	X	X	X	X	X
391	1075	2.0%	ALIZARINE ASTROL B	GEN	S	1	2	X	X	X	X	X
392	1075	0.5%	ALIZARINE ASTROL B	GEN	S	1	2	X	X	X	X	X
393	1058	2.0%	ALIZARINE URANOL 2B	GEN	S	1	2	X	X	X	X	X
394	1058	0.5%	ALIZARINE URANOL 2B	GEN	S	1	2	X	X	X	X	X
395	1078	2.0%	ALIZARINE CYANINE GREEN 3G	GEN	S	1	2	X	X	X	X	X
396	1078	0.5%	ALIZARINE CYANINE GREEN 3G	GEN	S	1	2	X	X	X	X	X
397	1078	2.0%	ALIZARINE CYANINE GREEN CG EX	CHEM	S	1	2	X	X	X	X	X
398	1078	0.5%	ALIZARINE CYANINE GREEN CG EX	CHEM	S	1	2	X	X	X	X	X
399	1053	2.0%	ALIZARINE SAPHIROL SE	DP	S	1	2	X	X	X	X	X
400	1053	0.5%	ALIZARINE SAPHIROL SE	DP	S	1	2	X	X	X	X	X
401	1088	2.0%	ALIZARINE SKY BLUE B	GEN	S	1	2	X	X	X	X	X
402	1088	0.5%	ALIZARINE SKY BLUE B	GEN	S	1	2	X	X	X	X	X
403	865	5.0%	NIGROSINE WSB CRYST	DP	S	1	1	X	X	X	X	X
404	865	1.0%	NIGROSINE WSB CRYST	DP	S	1	1	X	X	X	X	X
405	815	2.0%	THIOFLAVINE TCN	DP	S	1	1	X	X	X	X	X
406	815	0.5%	THIOFLAVINE TCN	DP	S	1	1	X	X	X	X	X
407	758	2.0%	VIOLAMINE RR	DP	S	1	1	X	X	X	X	X
408	758	0.5%	VIOLAMINE RR	DP	S	1	1	X	X	X	X	X
409	712	2.0%	KITON PURE BLUE V	CIBA	S	1	1	X	X	X	X	X
410	712	0.5%	KITON PURE BLUE V	CIBA	S	1	1	X	X	X	X	X
411	79	5.0%	SCARLET 2R	CENT	W	1	2	X	X	X	X	X
412	79	1.0%	SCARLET 2R	CENT	W	1	2	X	X	X	X	X
413	79	0.2%	SCARLET 2R	CENT	W	1	1	X	X	X	X	X
414	176	5.0%	FAST RED A	CAMP	W	1	3	X	X	X	XB	X
415	176	1.0%	FAST RED A	CAMP	W	1	1	X	X	X	X	X
416	176	0.2%	FAST RED A	CAMP	W	1	1	X	X	X	X	X
417	262	5.0%	ANTHRANOL CHROME RED B	US	W	2	3	X	X	X	XB	X
418	262	1.0%	ANTHRANOL CHROME RED B	US	W	2	3	X	X	X	XB	X
419	262	0.2%	ANTHRANOL CHROME RED B	US	W	2	1	X	X	X	X	X
420	57	5.0%	FAST CRIMSON 6BL	NA	W	1	2	X	X	X	X	X

TABLE 2—*Continued*

SERIAL NUMBER	COLOUR INDEX NUMBER	DYE AMOUNT	DYE NAME	DYE MANUFACTURER	FIBER	DYEING METHOD	GROUP	COMPARISON WITH SET A: SET B L = M	SET D L = M	SET E L = M	SET F L = M	SETS G & H L = M
1301	-	2.0%	ALIZAROL BLACK 3G	NA	W	4	4	X	X	X	X	X
1302	-	4.0%	ALIZAROL BLACK 3G	NA	W	4	5	X	X	X	X	X
1303	-	8.0%	ALIZAROL BLACK 3G	NA	W	4	5	X	X	X	X	X
1304	-	0.20%	ALIZARINE SUPRA BLUE A	GEN	W	1	2	X	X	X	X	X
1305	-	1.0%	ALIZARINE SUPRA BLUE A	GEN	W	1	3	X	X	X	X	X
1306	-	5.0%	ALIZARINE SUPRA BLUE A	GEN	W	1	4	X	X	X	X	X
1307	-	0.20%	NEOLAN GREEN B	CIBA	W	1	3	X	X	X	X	X
1308	-	1.0%	NEOLAN GREEN B	CIBA	W	1	3	X	X	X	X	X
1309	-	5.0%	NEOLAN GREEN B	CIBA	W	1	3	X	X	X	X	X
1310	-	0.20%	NEOLAN BLUE 2G	CIBA	W	1	3	X	X	X	X	X
1311	-	1.0%	NEOLAN BLUE 2G	CIBA	W	1	3	X	X	X	X	X
1312	-	5.0%	NEOLAN BLUE 2G	CIBA	W	1	4	X	X	X	X	X
1313	-	0.20%	NEOLAN ORANGE R	CIBA	W	1	4	X	X	X	X	X
1314	-	1.0%	NEOLAN ORANGE R	CIBA	W	1	4	X	X	X	X	X
1315	-	5.0%	NEOLAN ORANGE R	CIBA	W	1	5	X	X	X	X	X
1316	-	0.20%	ALIZARINE SUPRA BLUE R	GEN	W	1	3	X	X	X	X	X
1317	-	1.0%	ALIZARINE SUPRA BLUE R	GEN	W	1	3	X	X	X	X	X
1318	-	5.0%	ALIZARINE SUPRA BLUE R	GEN	W	1	3	X	X	X	X	X
1319	-	0.20%	NEOLAN YELLOW R	CIBA	W	1	3	X	X	X	X	X
1320	-	1.0%	NEOLAN YELLOW R	CIBA	W	1	3	X	X	X	X	X
1321	-	5.0%	NEOLAN YELLOW R	CIBA	W	1	4	X	X	X	X	X
1322	-	0.20%	NEOLAN RED 3B	CIBA	W	1	3	X	X	X	X	X
1323	-	1.0%	NEOLAN RED 3B	CIBA	W	1	3	X	X	X	X	X
1324	-	5.0%	NEOLAN RED 3B	CIBA	W	1	4	X	X	X	X	X
1325	1177	-	INDIGO, VAT DYED - LIGHT	DP	W	7	1	X	X	X	X	X
1326	1177	-	INDIGO, VAT DYED - MEDIUM	DP	W	7	4	X	X	X	X	X
1327	1177	-	INDIGO, VAT DYED - HEAVY	DP	W	7	5	X	X	X	X	X
1328	1178	1.25%	INDIGOSOL O	DH	W	8	2	X	X	X	X	X
1329	1178	4.0%	INDIGOSOL O	DH	W	8	4	X	X	X	X	X
1330	1178	15.0%	INDIGOSOL O	DH	W	8	5	X	X	X	X	X
1331	82	-	α-NAPHTHOL & α-NAPHTHYLAMINE	-	C	10	2	X	X	X	X	X
1332	44	-	β-NAPHTHOL & p-NITRANILINE	-	C	10	4	X	X	X	X	X
1333	38	-	β-NAPHTHOL & m-NITRANILINE	-	C	10	3	X	X	X	X	X
1334	-	4.0%	PONSOL RED AFF DBL PASTE	DP	C	7	1	X	X	X	X	X
1335	-	16.0%	PONSOL RED AFF DBL PASTE	DP	C	7	1	X	X	X	X	X
1336	1102	4.0%	PONSOL BLACK B DBL PASTE	DP	C	13	3	X	X	X	X	X
1337	1102	16.0%	PONSOL BLACK B DBL PASTE	DP	C	13	4	X	X	X	X	X
1338	654	0.50%	PONTAMINE DIAZO YELLOW 2GL,DEV Z	DP	C	3	1	X	X	X	X	X
1339	654	2.0%	PONTAMINE DIAZO YELLOW 2GL,DEV Z	DP	C	3	2	X	X	X	X	X
1340	353	0.50%	SOLANTINE PINK 4BL	NA	C	1	2	X	X	X	X	X
1341	353	2.0%	SOLANTINE PINK 4BL	NA	C	1	2	X	X	X	X	X
1342	-	0.50%	PONTAMINE LIGHT GRAY GG	DP	C	1	2	X	X	X	X	X
1343	-	2.0%	PONTAMINE LIGHT GRAY GG	DP	C	1	2	X	X	X	X	X
1344	-	0.50%	PONTAMINE BRILLIANT VIOLET B	DP	C	1	1	X	X	X	X	X
1345	-	2.0%	PONTAMINE BRILLIANT VIOLET B	DP	C	1	1	X	X	X	X	X
1346	-	0.50%	SOLANTINE RED 8BLN	NA	C	1	1	X	X	X	X	X
1347	-	2.0%	SOLANTINE RED 8BLN	NA	C	1	1	X	X	X	X	X
1348	-	0.50%	PONTAMINE DIAZO BROWN R, DEV Z	DP	C	3	3	X	X	X	X	X
1349	-	2.0%	PONTAMINE DIAZO BROWN R, DEV Z	DP	C	3	3	X	X	X	X	X
1350	-	0.50%	PONTAMINE DIAZO BROWN R, β-NAPHTHOL	DP	C	2	2	X	X	X	X	X
1351	-	2.0%	PONTAMINE DIAZO BROWN R, β-NAPHTHOL	DP	C	2	2	X	X	X	X	X
1352	-	0.50%	NIAGARA FAST BLUE RL	NA	C	1	2	X	X	X	X	X
1353	-	2.0%	NIAGARA FAST BLUE RL	NA	C	1	3	X	X	X	X	X
1354	-	0.50%	SOLANTINE BROWN R	NA	C	1	2	X	X	X	X	X
1355	-	2.0%	SOLANTINE BROWN R	NA	C	1	2	X	X	X	X	X
1356	-	1.0%	INDANTHRENE YELLOW BROWN 3G PASTE	GEN	C	7	4	X	X	X	X	X
1357	-	5.0%	INDANTHRENE YELLOW BROWN 3G PASTE	GEN	C	7	5	X	X	X	X	X
1358	-	1.0%	INDANTHRENE BLUE 8 GK PASTE	GEN	C	7	3	X	X	X	X	X
1359	-	5.0%	INDANTHRENE BLUE 8 GK PASTE	GEN	C	7	4	X	X	X	X	X
1360	-	1.5%	INDANTHRENE KHAKI GG PASTE	GEN	C	7	4	X	X	X	X	X
1361	-	7.50%	INDANTHRENE KHAKI GG PASTE	GEN	C	7	5	X	X	X	X	X
1362	1150	1.50%	INDANTHRENE OLIVE R PASTE	GEN	C	7	4	X	X	X	X	X
1363	1150	7.50%	INDANTHRENE OLIVE R PASTE	GEN	C	7	4	X	X	X	X	X
1364	-	1.0%	INDANTHRENE SCARLET R PASTE	GEN	C	7	3	X	X	X	X	X
1365	-	5.0%	INDANTHRENE SCARLET R PASTE	GEN	C	7	3	X	X	X	X	X
1366	-	2.0%	HELINDONE BLUE B PASTE	GEN	C	7	2	X	X	X	X	X
1367	-	10.0%	HELINDONE BLUE B PASTE	GEN	C	7	3	X	X	X	X	X
1368	-	1.0%	INDANTHRENE GOLDEN YELLOW GK DBL PASTE	GEN	C	7	2	X	X	X	X	X
1369	-	5.0%	INDANTHRENE GOLDEN YELLOW GK DBL PASTE	GEN	C	7	3	X	X	X	X	X

TABLE 2—*Continued*

SERIAL NUMBER	COLOUR INDEX NUMBER	DYE AMOUNT	DYE NAME	DYE MANUFACTURER	FIBER	DYEING METHOD	GROUP	COMPARISON WITH SET A: SET B L = M	SET D L = M	SET F L = M	SET F L = M	SETS G & H L = M
844	-	10.0%	PONSOL GOLD ORANGE RRT DBL PDR	DP	S	6	2	X	X	X	X	X
845	-	1.0%	PONSOL GOLD ORANGE RRT DBL PDR	DP	S	6	2	X	X	X	X	X
846	969	10.0%	SULFANTHRENE BLUE GR PASTE	DP	S	6	2	X	X	X	X	X
847	969	1.0%	SULFANTHRENE BLUE GR PASTE	DP	S	6	2	X	X	X	X	X
848	346	2.0%	PONTAMINE LIGHT YELLOW 5GX	DP	S	3	2	X	X	X	X	X
849	346	0.5%	PONTAMINE LIGHT YELLOW 5GX	DP	S	3	2	X	X	X	X	X
850	227	2.0%	DIRECT FAST SCARLET R	PEER	S	3	2	X	X	X	X	X
851	227	0.5%	DIRECT FAST SCARLET R	PEER	S	3	1	X	X	X	X	X
852	-	2.0%	PONTAMINE FAST RED 8BL	DP	S	3	3	X	X	X	XB	X
853	-	0.5%	PONTAMINE FAST RED 8BL	DP	S	3	2	X	X	X	X	X
854	-	2.0%	ANTHOSINE 5B	GEN	S	1	2	X	X	X	X	X
855	-	0.5%	ANTHOSINE 5B	GEN	S	1	2	X	X	X	X	X
856	-	2.0%	ANTHOSINE 3B	GEN	S	1	2	X	X	X	X	X
857	-	0.5%	ANTHOSINE 3B	GEN	S	1	2	X	X	X	X	X
858	704	2.0%	ALKALI BLUE L	CAL	S	5	1	X	X	X	X	X
859	704	0.5%	ALKALI BLUE L	CAL	S	5	1	X	X	X	X	X
860	729	1.0%	VICTORIA BLUE BX	DP	S	2	1	X	X	X	X	X
861	729	0.25%	VICTORIA BLUE BX	DP	S	2	1	X	X	X	X	X
862	749	1.0%	RHODAMINE B EXTRA	DP	S	2	1	X	X	X	X	X
863	749	0.25%	RHODAMINE B EXTRA	DP	S	2	1	X	X	X	X	X
864	768	2.0%	EOSINE Y	GEN	S	2	1	X	X	X	X	X
865	768	0.5%	EOSINE Y	GEN	S	2	1	X	X	X	X	X
866	773	2.0%	ERYTHROSINE B	DP	S	2	1	X	X	X	X	X
867	773	0.5%	ERYTHROSINE B	DP	S	2	1	X	X	X	X	X
868	793	0.5%	PHOSPHINE G CONC	DP	S	2	1	X	X	X	X	X
869	793	2.0%	PHOSPHINE G CONC	DP	S	2	1	X	X	X	X	X
870	-	0.5%	POLAR RED B CONC	GEI	S	1	1	X	X	X	X	X
871	-	2.0%	POLAR RED B CONC	GEI	S	1	2	X	X	X	X	X
872	430	2.0%	POLAR RED G CONC	GEI	S	1	2	X	X	X	X	X
873	430	0.5%	POLAR RED G CONC	GEI	S	1	2	X	X	X	X	X
874	692	0.5%	ACID MAGENTA CRYST	CIBA	S	1	1	X	X	X	X	X
875	692	2.0%	ACID MAGENTA CRYST	CIBA	S	1	1	X	X	X	X	X
876	1091	2.0%	ALIZARINE RUBINOL R	GEN	S	1	2	X	X	X	X	X
877	1091	0.5%	ALIZARINE RUBINOL R	GEN	S	1	2	X	X	X	X	X
878	1091	2.0%	ALIZARINE RUBINOL 3G	GEN	S	1	2	X	X	X	X	X
879	1091	0.5%	ALIZARINE RUBINOL 3G	GEN	S	1	2	X	X	X	X	X
880	1073	2.0%	ALIZARINE IRISOL R	GEN	S	1	2	X	X	X	X	X
881	1073	0.5%	ALIZARINE IRISOL R	GEN	S	1	2	X	X	X	X	X
882	797	2.0%	EUCHRYSINE RRDX	GEN	S	2	1	X	X	X	X	X
883	797	0.5%	EUCHRYSINE RRDX	GEN	S	2	1	X	X	X	X	X
884	913	2.0%	NILE BLUE BX	GEN	S	4	1	X	X	X	X	X
885	913	0.5%	NILE BLUE BX	GEN	S	4	1	X	X	X	X	X
886	752	1.0%	RHODAMINE 6G EXTRA	DP	S	2	1	X	X	X	X	X
887	752	0.25%	RHODAMINE 6G EXTRA	DP	S	2	1	X	X	X	X	X
888	317	4.0%	PONTAMINE DIAZO BLUE M	DP	S	7	3	X	X	X	XB	X
889	387	2.0%	DIRECT VIOLET R	CAL	S	3	1	X	X	X	X	X
890	387	0.5%	DIRECT VIOLET R	CAL	S	3	1	X	X	X	X	X
891	-	2.0%	PONTAMINE FAST BLUE 2GL	DP	S	3	2	X	X	X	X	X
892	-	0.5%	PONTAMINE FAST BLUE 2GL	DP	S	3	2	X	X	X	X	X
893	-	2.0%	BENZO FAST ORANGE 2RL	GEN	S	3	2	X	X	X	X	X
894	-	0.5%	BENZO FAST ORANGE 2RL	GEN	S	3	2	X	X	X	X	X
895	319	2.0%	BENZO FAST HELIOTROPE BL	GEN	S	3	2	X	X	X	X	X
896	319	0.5%	BENZO FAST HELIOTROPE BL	GEN	S	3	2	X	X	X	X	X
897	353A	2.0%	BENZO FAST HELIOTROPE 4BL	GEN	S	3	2	X	X	X	X	X
898	353A	0.5%	BENZO FAST HELIOTROPE 4BL	GEN	S	3	1	X	X	X	X	X
899	-	2.0%	TOLUYLENE FAST ORANGE GL	GEN	S	3	2	X	X	X	X	X
900	-	0.5%	TOLUYLENE FAST ORANGE GL	GEN	S	3	2	X	X	X	X	X
901	-	2.0%	BENZO FAST BROWN 3GL	GEN	S	3	2	X	X	X	X	X
902	-	0.5%	BENZO FAST BROWN 3GL	GEN	S	3	2	X	X	X	X	X
903	-	2.0%	ANTHOSINE B	GEN	S	1	2	X	X	X	X	X
904	-	0.5%	ANTHOSINE B	GEN	S	1	2	X	X	X	X	X
905	-	10.0%	ALIZARINE INDIGO GRAY B PDR	GEN	S	6	2	X	X	X	X	X
906	-	10.0%	ALIZARINE INDIGO VIOLET B PDR	GEN	S	6	2	X	X	X	X	X
907	-	20.0%	ALIZARINE INDIGO GREEN B PASTE	GEN	S	6	3	X	X	X	XB	X
908	-	20.0%	ALIZARINE INDIGO GREEN G PASTE	GEN	S	6	2	X	X	X	X	X
909	-	40.0%	ALIZARINE INDIGO BROWN R PASTE	GEN	S	6	5	X	X	X	X	X
910	-	2.0%	BENZOFORM YELLOW GL	GEN	S	3	2	X	X	X	X	X
911	-	0.5%	BENZOFORM YELLOW GL	GEN	S	3	2	X	X	X	X	X
912	-	2.0%	CHLORAMINE VIOLET R	GEN	S	3	2	X	X	X	X	X
913	-	0.5%	CHLORAMINE VIOLET R	GEN	S	3	2	X	X	X	X	X

TABLE 2—*Continued*

SERIAL NUMBER	COLOUR INDEX NUMBER	AMOUNT	DYE NAME	MANUFACTURER	FIBER	DYEING METHOD	GROUP	COMPARISON WITH SET A									
								SET B		SET D		SET E		SET F		SETS G & H	
								L	M	L	M	L	M	L	M	L	M
211	184	2.00%	AMARANTH 200%	NEW	S	1	1	X		X		X		X		X	
212	184	0.5%	AMARANTH 200%	NEW	S	1	1	X		X		X		X		X	
213	667	0.5%	FAST ACID GREEN B	NA	S	1	1		X	X		X		X			X
214	667	2.0%	FAST ACID GREEN B	NA	S	1	1		X	X		X		X			X
215	712	2.0%	ALPHAZURINE 2G	NA	S	1	1	X		X		X		X			X
216	712	0.5%	ALPHAZURINE 2G	NA	S	1	1	X		X		X		X			X
217	1180	5.0%	INDIGOTINE CONC	NA	S	1	1	X		X		X			X		X
218	1180	1.0%	INDIGOTINE CONC	NA	S	1	1		X		X		X		X	X	
219	714	2.0%	ALPHAZURINE A	NA	S	1	1	X		X		X		X			X
220	714	0.5%	ALPHAZURINE A	NA	S	1	1	X		X		X		X			X
221	801	2.0%	QUINOLINE YELLOW 180%	NA	S	1	2	X			X	X		X		X	
222	801	0.5%	QUINOLINE YELLOW 180%	NA	S	1	1	X		X		X		X		X	
223	382	2.0%	ERIE SCARLET 3B	NA	S	3	2	X		X		X		X		X	
224	382	0.5%	ERIE SCARLET 3B	NA	S	3	2	X		X		X		X		X	
225	735	2.0%	ALKALI FAST GREEN 2G	NA	S	1	1	X		X		X		X			X
226	735	0.5%	ALKALI FAST GREEN 2G	NA	S	1	1	X		X		X		X		X	
227	234	2.0%	RESORCIN BROWN R	NA	S	1	1	X		X		X		X		X	
228	234	0.5%	RESORCIN BROWN R	NA	S	1	1	X		X		X		X		X	
229	27	2.0%	WOOL ORANGE 2G CRYST	NA	S	1	2	X		X		X		X		X	
230	27	0.5%	WOOL ORANGE 2G CRYST	NA	S	1	2	X		X		X		X		X	
231	57	2.0%	FAST CRIMSON 6BL	NA	S	1	1	X		X		X		X		X	
232	57	0.5%	FAST CRIMSON 6BL	NA	S	1	1		X		X	X		X		X	
233	151	2.0%	WOOL ORANGE A CONC	NA	S	1	2	X		X		X		X		X	
234	151	0.5%	WOOL ORANGE A CONC	NA	S	1	1		X	X		X		X		X	
235	657	2.0%	VICTORIA GREEN WB CRYST	NA	S	2	1	X		X		X		X		X	
236	657	0.5%	VICTORIA GREEN WB CRYST	NA	S	2	1	X		X		X		X		X	
237	841	2.0%	SAFRANINE A CONC	NA	S	4	1	X			X	X			X	X	
238	841	0.5%	SAFRANINE A CONC	NA	S	4	1	X		X			X		X	X	
239	922	2.0%	METHYLENE BLUE 2B	NA	S	4	1	X		X		X		X		X	
240	922	0.5%	METHYLENE BLUE 2B	NA	S	4	1	X		X		X			X	X	
241	411	2.0%	ERIE YELLOW KM	NA	S	3	2	X		X		X		X			X
242	411	0.5%	ERIE YELLOW KM	NA	S	3	2	X		X		X		X			X
243	478	2.0%	ERIE ORANGE Y	NA	S	3	1	X		X		X		X		X	
244	478	0.5%	ERIE ORANGE Y	NA	S	3	1	X		X		X		X		X	
245	401	2.0%	DIAZINE BLACK H EXTRA	NA	S	3	1	X		X		X		X		X	
246	401	0.5%	DIAZINE BLACK H EXTRA	NA	S	3	1	X		X		X		X		X	
247	128	2.0%	ERIE PINK 2B	NA	S	3	1	X		X		X		X		X	
248	128	0.5%	ERIE PINK 2B	NA	S	3	1	X		X		X		X		X	
249	539	5.0%	ERIE BLACK NR EXTRA	NA	S	3	1	X		X		X		X		X	
250	539	1.0%	ERIE BLACK NR EXTRA	NA	S	3	1	X		X		X		X		X	
251	56	2.0%	FAST FUCHSINE 6B	NA	S	1	2	X		X		X		X		X	
252	56	0.5%	FAST FUCHSINE 6B	NA	S	1	2	X		X		X		X		X	
253	-	2.0%	SOLANTINE VIOLET R	NA	S	3	2		X	X		X		X		X	
254	-	0.5%	SOLANTINE VIOLET R	NA	S	3	2		X	X		X		X		X	
255	666	2.0%	ACID GREEN L	NA	S	1	1	X		X		X		X		X	
256	666	0.5%	ACID GREEN L	NA	S	1	1	X		X		X		X		X	
257	252	2.0%	CROCEIN SCARLET MOO	NA	S	1	2	X		X		X		X		X	
258	252	0.5%	CROCEIN SCARLET MOO	NA	S	1	2	X		X		X		X		X	
259	146	2.0%	AZO YELLOW A 5W	NA	S	1	1	X		X		X		X			X
260	146	0.5%	AZO YELLOW A 5W	NA	S	1	1	X		X		X		X			X
261	176	2.0%	FAST RED S CONC	NA	S	1	1	X		X		X		X		X	
262	176	0.5%	FAST RED S CONC	NA	S	1	1	X		X		X		X		X	
263	698	2.0%	WOOL VIOLET 4BN	NA	S	1	1	X		X		X		X		X	
264	698	0.5%	WOOL VIOLET 4BN	NA	S	1	1	X		X		X		X		X	
265	861	2.0%	INDULINE B EXTRA	NA	S	1	1	X		X		X		X		X	
266	861	0.5%	INDULINE B EXTRA	NA	S	1	1	X		X		X		X		X	
267	680	1.0%	METHYL VIOLET 2B	NA	S	2	1	X		X		X		X		X	
268	680	0.25%	METHYL VIOLET 2B	NA	S	2	1	X		X		X		X		X	
269	812	10.0%	PRIMULINE NAC	NA	S	7	2	X		X		X		X		X	
270	870	-	ANILINE BLACK	-	C	11	3	X			X	X		XA		X	
271	-	2.0%	PONTAMINE FAST ORANGE EG	DP	C	1	3		X		X	X		XA			X
272	-	0.5%	PONTAMINE FAST ORANGE EG	DP	C	1	2	X		X		X		X			X
273	1006	4.0%	SULFOGENE GREEN M CONC	DP	C	8	2	X		X		X		X		X	
274	1006	1.0%	SULFOGENE GREEN M CONC	DP	C	8	2	X		X		X		X		X	
275	-	4.0%	KRYOGENE VIOLET 3RX	GEN	C	8	1	X		X		X		X		X	
276	-	1.0%	KRYOGENE VIOLET 3RX	GEN	C	8	1	X		X		X		X		X	
277	-	4.0%	CROSS-DYE GREEN 2G CONC	BDC	C	8	2	X		X		X		X		X	
278	-	1.0%	CROSS-DYE GREEN 2G CONC	BDC	C	8	2	X		X		X		X		X	
279	978	4.0%	SULPHUR BLACK R EX CONC	NA	C	8	3	X		X		X		XB		X	
280	978	1.0%	SULPHUR BLACK R EX CONC	NA	C	8	2	X		X		X		X		X	

TABLE 2—*Continued*

SERIAL NUMBER	COLOUR INDEX NUMBER	DYE AMOUNT	DYE NAME	DYE MANUFACTURER	FIBER	DYEING METHOD	GROUP	COMPARISON WITH SET A: SET B L = M	SET B M	SET D L = M	SET D M	SET E L = M	SET E M	SET F L = M	SET F M	SETS G & H L = M	SETS G & H M
914	677	1.0%	FUCHSINE RS CRYST	CAL	S	4	1	X		X		X		X		X	
915	677	0.25%	FUCHSINE RS CRYST	CAL	S	4	1	X		X		X		X		X	
916	662	2.0%	BRILLIANT GREEN CRYST	CAL	S	2	1	X		X		X		X			X
917	662	0.5%	BRILLIANT GREEN CRYST	CAL	S	2	1	X		X		X		X			X
918	655	3.0%	AURAMINE CONC	DP	S	2	1	X		X		X		X		X	
919	655	1.0%	AURAMINE CONC	DP	S	2	1	X		X		X		X		X	
920	20	3.0%	CHRYSOIDINE Y EX	GEN	S	2	1	X		X		X		X		X	
921	20	1.0%	CHRYSOIDINE Y EX	GEN	S	2	1	X		X		X		X		X	
922	-	2.0%	PONTACYL LIGHT RED BL	DP	S	1	2	X		X		X		X		X	
923	-	0.5%	PONTACYL LIGHT RED BL	DP	S	1	2	X		X		X		X		X	
924	-	2.0%	POLAR MAROON V CONC	GEI	S	1	2	X		X		X		X		X	
925	-	0.5%	POLAR MAROON V CONC	GEI	S	1	2	X		X		X		X		X	
926	1162	20.0%	ANTHRENE RED BN EXTRA PASTE	NEW	S	6	3	X		X		X		XA		X	
927	1162	2.0%	ANTHRENE RED BN EXTRA PASTE	NEW	S	6	2	X		X		X		X		X	
928	-	4.0%	PYROGEN GREEN GK	CIBA	C	8	2	X		X		X		X		X	
929	-	1.0%	PYROGEN GREEN GK	CIBA	C	8	2	X		X		X		X		X	
930	988	4.0%	SULFOGENE CARBON BB CONC	DP	C	8	5	X		X		X		X			X
931	988	1.0%	SULFOGENE CARBON BB CONC	DP	C	8	2	X		X		X		X		X	
932	-	4.0%	SULFOGENE DARK BROWN GN EX	DP	C	8	3	X		X		X		XA		X	
933	-	1.0%	SULFOGENE DARK BROWN GN EX	DP	C	8	2	X			X	X		X		X	
934	-	4.0%	SULFOGENE BRILLIANT BLUE GG CONC	DP	C	8	2	X		X		X		X		X	
935	-	1.0%	SULFOGENE BRILLIANT BLUE GG CONC	DP	C	8	2	X		X		X		X		X	
936	-	4.0%	SULFOGENE CUTCH O	DP	C	8	2	X		X		X		X		X	
937	-	1.0%	SULFOGENE CUTCH O	DP	C	8	2	X		X		X		X			X
938	1183	20.0%	INDIGO RB PDR	GEN	C	7	2	X			X		X		X	X	
939	1183	5.0%	INDIGO RB PDR	GEN	C	7	2		X		X		X		X		X
940	-	-	NAPHTHOL AS & FAST BLUE B SALT	GEN	C	10	2		X		X		X		X	X	
941	-	-	NAPHTHOL AS & FAST ORANGE R SALT	GEN	C	10	2	X			X	X			X		X
942	-	5.0%	SULFANTHRENE PINK FF PASTE	DP	C	7	2	X			X	X		X			X
943	-	20.0%	SULFANTHRENE PINK FF PASTE	DP	C	7	2	X		X		X		X			X
944	1104	3.0%	PONSOL VIOLET RRD PASTE	DP	C	7	2	X		X		X		X		X	
945	1104	12.0%	PONSOL VIOLET RRD PASTE	DP	C	7	3	X		X		X		XA		X	
946	1161	5.0%	PONSOL RED VIOLET RRNX PASTE	DP	C	7	3	X		X		X		XA		X	
947	1161	20.0%	PONSOL RED VIOLET RRNX PASTE	DP	C	7	5	X		X		X		X		X	
948	1113	2.5%	PONSOL BLUE GD DBL PASTE	DP	C	7	5	X		X		X		X		X	
949	1113	10.0%	PONSOL BLUE GD DBL PASTE	DP	C	7	5	X		X		X		X		X	
950	1099	2.0%	PONSOL DARK BLUE BR PASTE	DP	C	7	1	X		X		X		X		X	
951	1099	8.0%	PONSOL DARK BLUE BR PASTE	DP	C	7	2	X		X		X		X		X	
952	1101	5.0%	ANTHRENE JADE GREEN PASTE	NEW	C	7	3	X		X		X		XB		X	
953	1101	20.0%	ANTHRENE JADE GREEN PASTE	NEW	C	7	5	X		X		X		X		X	
954	1102	5.0%	PONSOL GREEN BN PASTE	DP	C	7	2	X		X		X			X	X	
955	1102	20.0%	PONSOL GREEN BN PASTE	DP	C	7	2	X		X		X		X		X	
956	1102	5.0%	PONSOL GREEN BN PASTE	DP	C	13	3		X		X		XA		X		
957	1102	20.0%	PONSOL GREEN BN PASTE	DP	C	13	5	X			X		X		X		
958	1202	5.0%	ALIZARINE INDIGO G PASTE	GEN	C	7	2	X		X		X		X			X
959	1202	20.0%	ALIZARINE INDIGO G PASTE	GEN	C	7	2	X		X		X		X		X	
960	1228	5.0%	CIBA SCARLET G PASTE	CIBA	C	7	2	X			X		X		X		X
961	1228	20.0%	CIBA SCARLET G PASTE	CIBA	C	7	2	X			X		X		X		X
962	1184	5.0%	CIBA BLUE 2BD PASTE	CIBA	C	7	2	X			X		X		X		X
963	1184	20.0%	CIBA BLUE 2BD PASTE	CIBA	C	7	2	X			X	X			X		X
964	971	1.0%	HYDRON BLUE G PDR	GEN	C	7	2	X		X		X		X		X	
965	971	4.0%	HYDRON BLUE G PDR	GEN	C	7	2	X		X		X		X		X	
966	-	0.5%	CIBANON ORANGE 6R PDR	CIBA	C	7	3	X			X	X		XA		X	
967	-	2.0%	CIBANON ORANGE 6R PDR	CIBA	C	7	5	X			X		X		X	X	
968	1227	1.25%	HELINDONE BROWN G PDR	GEN	C	7	2	X		X		X		X		X	
969	1227	5.0%	HELINDONE BROWN G PDR	GEN	C	7	2	X		X		X		X		X	
970	1217	1.25%	HELINDONE ORANGE R PDR	GEN	C	7	2	X			X		X		X		X
971	1217	5.0%	HELINDONE ORANGE R PDR	GEN	C	7	2	X			X		X		X		X
972	1170	1.25%	CIBANON YELLOW R PDR	CIBA	C	7	2	X			X		X		X		X
973	1170	5.0%	CIBANON YELLOW R PDR	CIBA	C	7	2	X			X		X		X		X
974	1118	5.0%	PONSOL YELLOW G DBL PASTE	DP	C	7	1	X		X		X		X		X	
975	1118	1.25%	PONSOL YELLOW G DBL PASTE	DP	C	7	2	X		X		X		X		X	
976	-	2.5%	PONSOL GOLD ORANGE RRT PASTE	DP	C	7	3	X		X		X		XA		X	
977	-	10.0%	PONSOL GOLD ORANGE RRT PASTE	DP	C	7	3	X		X		X		X	A	X	
978	1096	2.5%	PONSOL GOLD ORANGE G DBL PASTE	DP	C	7	2	X			X	X		X		X	
979	1096	10.0%	PONSOL GOLD ORANGE G DBL PASTE	DP	C	7	3	X		X		X		XA		X	
980	-	5.0%	ANTHRENE GOLD ORANGE 4R PASTE	NEW	C	7	2	X		X		X		X		X	
981	-	20.0%	ANTHRENE GOLD ORANGE 4R PASTE	NEW	C	7	2	X		X		X		X		X	
982	-	5.0%	CIBA PINK BG PASTE	CIBA	C	7	2	X		X		X		X			X
983	-	20.0%	CIBA PINK BG PASTE	CIBA	C	7	3	X		X		X		XA			X

TABLE 3—Dyes Arranged by Colour Index Number

(c = cotton; w = wool; s = silk; sw = weighted silk)

Colour Index No.	Dyed Sample Number	Fiber
5	607— 609	w
	1500	w
10	643— 645	w
16	379— 380	s
20	920— 921	s
	1034—1035	c
27	229— 230	s
	438— 440	w
29	55— 56	s
31	383— 384	s
	468— 470	w
32	371— 372	s
36	586— 588	w
38	1333	c
40	595— 597	w
44	1332	c
54	447— 449	w
	1503	w
56	251— 252	s
	453— 455	w
57	231— 232	s
	420— 422	w
	429— 431	w
59	1435—1437	w
63	619— 621	w
79	57— 58	s
	411— 413	w
	1490	s
	1506	w
82	1331	c
101	558— 560	w
110	592— 594	w
126	99— 100	s
	171— 172	c
127	111— 112	c
128	173— 174	c
	247— 248	s
130	127— 128	c
135	1024—1025	c
	1493	c
138	381— 382	s
	435— 437	w
146	259— 260	s
	1389—1391	w
151	233— 234	s
	444— 446	w
153	462— 464	w
154	377— 378	s
167	552— 554	w
168	1380—1382	w
169	568— 570	w
170	546— 548	w
173	1374—1376	w
176	261— 262	s
	375— 376	s
	414— 416	w
	1477	sw
	1482	s
179	51— 52	s
	739— 741	w
180	574— 576	w
184	211— 212	s
	426— 428	w
	1504	w
185	373— 374	s
195	589— 591	w
201	796— 798	w
202	805— 807	w
203	799— 801	w
204	808— 810	w
208	760— 762	w
209	1386—1388	w
216	598— 600	w
219	793— 795	w
227	850— 851	s
234	227— 228	s
	622— 624	w
246	772— 774	w
	369	s
	1429—1431	w
252	257— 258	s
	459— 461	w
262	417— 419	w
273	141— 142	c
	487— 488	s
278	77— 78	s
	191— 192	c
	1499	c
289	367— 368	s
	625— 627	w
	1461—1464	sw
	1473—1476	s
292	814— 816	w
299	787— 789	w
302	610— 612	w
307	370	s
	658— 660	w
316	19— 20	c
317	21— 22	c
	888	s
319	895— 896	s
324a	5— 6	c
	9— 10	c
	496	s
	499	s
326	131— 132	c
	195— 196	c
	203— 204	s
331	1038—1039	c
336	540— 542	w
346	151— 152	c
	848— 849	s
353	1340—1341	c
353a	897— 898	s
365	157— 158	c
	207— 208	s
	655— 657	w
	1455—1456	sw
382	117— 118	c
	223— 224	s
	634— 639	w
	1451—1454	sw
	1471—1472	s
387	889— 890	s
394	97— 98	s
	167— 168	c
	1489	s
401	37— 40	c
	45— 46	c
	245— 246	s
406	95— 96	s
	165— 166	c
410	123— 124	c
411	241— 242	s
415	91— 92	s
	109— 110	c
	613— 615	w
	1420—1422	w
419	59— 60	s
	193— 194	c
	1488	s
	1502	w
420	93— 94	s
	147— 148	c
	652— 654	w
430	872— 873	s
431	616— 618	w
448	83— 84	s
	121— 122	c
471	169— 170	c
	200	s
477	89— 90	s
478	105— 106	c
	243— 244	s
	1449—1450	sw
487	604— 606	w
502	183— 184	c
512	81— 82	s
	185— 186	c
518	87— 88	s
	133— 136	c
	1494	c
519	640— 642	w
520	85— 86	s
539	161— 162	c
	249— 250	s
561	113— 114	c
	479— 480	s
576	65— 66	s
	129— 130	c
581	63— 64	s
	119— 120	c
	1447—1448	sw
593	69— 70	s
	181— 182	c
	646— 648	w
	1445—1446	sw
594	67— 68	s
	177— 178	c
598	61— 62	s
	115— 116	c
620	155— 156	c
621	103— 104	c
	205— 206	s
636	389— 390	s
	727— 729	w
	1395—1397	w
639	387— 388	s
	721— 723	w
640	385— 386	s
	718— 720	w
642	1392—1394	w
645	730— 732	w
652	790— 792	w
654	25— 26	c
	1338—1339	c
655	918— 919	s
	1018—1019	c
657	235— 236	s
	996— 997	c
658	1040—1041	c
661	365— 366	s
	1036—1037	c
662	916— 917	s
	992— 993	s
666	255— 256	s
	778— 780	w
667	213— 214	s
	775— 777	w
	1459—1460	sw
677	914— 915	s
	1002—1003	c
680	267— 268	s
	1014—1015	c
	1491	s
681	1042—1043	c
692	742— 744	w
	874— 875	s
696	601— 603	w
	363— 364	s
698	263— 264	s
	628— 630	w
	1457—1458	sw
699	1469—1470	s
704	858— 859	s
707	361— 362	s
710	149— 150	c
712	215— 216	s
	409— 410	s
	769— 771	w
714	219— 220	s
	649— 651	w
717	766— 768	w
720	811— 813	w
728	1481	sw
	1484	s
729	754— 756	w
	860— 861	s
	1016—1017	c

TABLE 3—Dyes Arranged by Colour Index Number—*Continued*

(c = cotton; w = wool; s = silk; sw = weighted silk)

Colour Index No.	Dyed Sample Number	Fiber
735	225— 226	s
	441— 443	w
737	450— 452	w
	1467—1468	s
749	862— 863	s
	1006—1007	c
752	886— 887	s
	1012—1013	c
758	407— 408	s
	465— 467	w
	1485	s
	1505	w
768	864— 865	s
773	866— 867	s
793	868— 869	s
	1030—1031	c
797	882— 883	s
	1026—1027	c
801	221— 222	s
	423— 425	w
812	11— 12	c
	27— 28	c
	269	s
813	125— 126	c
	201— 202	s
814	79— 80	s
	175— 176	c
	631— 633	w
815	405— 406	s
	1022—1023	c
816	197— 198	c
	485— 486	s
841	237— 238	s
	998— 999	c
843	994— 995	c
861	265— 266	s
865	403— 404	s
870	270	c
873	209— 210	s
	1004—1005	c
876	1032—1033	c
883	577— 579	w
909	1010—1011	c
913	884— 885	s
	1020—1021	c
922	239— 240	s
	1008—1009	c
	1497	c
924	580— 582	w
	1000—1001	c
926	1028—1029	c
931	580— 582	w
948	293— 294	c
949	289— 290	c
956	283— 284	c
969	527— 528	s
	846— 847	s
971	964— 965	c
	1496	c
978	535— 536	s
	279— 280	c
	1495	c
988	930— 931	c
1006	273— 274	c
1012	287— 288	c
1034	682— 684	w
1035	676— 678	w
1039	1508	c
1051	679— 681	w
1053	399— 400	s
	694— 696	w
1054	706— 708	w
1058	393— 394	s
1060	1417—1419	w
1062	685— 687	w
1067	688— 690	w
1073	697— 699	w
	880— 881	s
1075	391— 392	s
	817— 819	w
1076	700— 702	w
1078	395— 398	s
	712— 714	w
1080	709— 711	w
1081	673— 675	w
1085	691— 693	w
1088	401— 402	s
	703— 705	w
1089	715— 717	w
1091	661— 663	w
	876— 879	s
1092	664— 666	w
1095	309— 310	c
	517— 518	s
1096	830— 831	s
	978— 979	c
1099	525— 526	s
	950— 951	c
1101	511— 512	s
	952— 953	c
1102	523— 524	s
	539	s
	954— 957	c
	1336—1337	c
1104	826— 827	s
	944— 945	c
	1483	s
1109	1044—1045	c
1111	341— 342	c
	507— 508	s
1113	505— 506	s
	948— 949	c
1115	1492	c
1116	305— 306	c
	822— 823	s
1118	521— 522	s
	974— 975	c
1131	317— 318	c
1132	319— 320	c
	824— 825	s
1134	321— 322	c
	501— 502	s
1136	315— 316	c
1143	327— 328	c
1145	297— 298	c
1150	1362—1363	c
1151	295— 296	c
1152	311— 312	c
1161	513— 514	s
	946— 947	c
1162	337— 338	c
	926— 927	s
	1487	s
1163	335— 336	c
1170	972— 973	c
1172	1046—1047	c
1177	358— 359	c
	360	c
	1325—1327	w
1178	1328—1330	w
1180	217— 218	s
	748— 750	w
	1507	w
1183	938— 939	c
1184	515— 516	s
	962— 963	c
	1405—1407	w
1186	503— 504	s
	988— 989	c
1189	356— 357	c
	842— 843	s
1202	958— 959	c
1207	354— 355	c
	1402—1404	w
1212	333— 334	c
	529— 530	s
1217	531— 532	s
	970— 971	c
1219	838— 839	s
	990— 991	c
1222	832— 833	s
	986— 987	c
1226	533— 534	s
	984— 985	c
1227	836— 837	s
	968— 969	c
1228	960— 961	c
1232	784— 785	w
1246	786	w
	1444	sw

TABLE 4

Dyes to Which Colour Index Numbers Cannot Be Assigned Arranged Alphabetically by Name

(c = cotton; w = wool; s = silk; sw = weighted silk)

Name of Dye	Dyed Sample Number	Fiber
Acid Alizarine Gray G	1480	sw
	1486	s
Acid Anthracene Brown PG	561— 563	w
Acid Anthracene Brown RHA	555— 557	w
Alizarine Black RB Powder	1411—1413	w
Alizarine Direct Violet ER	667— 669	w
Alizarine Fast Gray 2BL	670— 672	w
Alizarine Indigo Brown R Paste	909	s
Alizarine Indigo Gray B Powder	905	s
Alizarine Indigo Green B Paste	907	s
Alizarine Indigo Green G Paste	908	s
Alizarine Indigo Violet B Powder	906	s
Alizarine Red WB	1414—1416	w
Alizarine Supra Blue A	1304—1306	w
	1479	sw
Alizarine Supra Blue R	1316—1318	w
Alizarol Black 3G	1301—1303	w
Anthosine B	903— 904	s
Anthosine 3B	856— 857	s
Anthosine 5B	854— 855	s
Anthracene Chromate Brown EB	549— 551	w
Anthraquinone Green GXNO	1501	w
Anthrene Gold Orange 4R Paste	980— 981	c
Benzo Fast Blue 8GL	163— 164	c
	491— 492	s
Benzo Fast Brown 3GL	901— 902	s

Proceedings of the American Association of Textile Chemists and Colorists

Name of Dye	Dyed Sample Number	Fiber
Benzo Fast Gray BL	159— 160	c
	481— 482	s
Benzo Fast Orange 2RL	893— 894	s
Benzoform Yellow GL	910— 911	s
Benzyl Fast Blue L	745— 747	w
Brilliant Benzo Fast Yellow GL	153— 154	c
	477— 478	s
Brilliant Milling Blue B	763— 765	w
Buffalo Black 3G	1432—1434	w
Chloramine Fast Orange ER	107— 108	c
	473— 474	s
Chloramine Violet R	912— 913	s
Chlorantine Fast Green B	179— 180	c
	483— 484	s
Chlorantine Fast Violet 4BL	189— 190	c
	471— 472	s
Chlorantine Fast Yellow 4GL	489— 490	s
Chlorazol Fast Brown RK	143— 144	c
Chromate Brilliant Brown R	564— 567	w
Ciba Pink BG Paste	982— 983	c
Ciba Pink BG Powder	834— 835	s
Cibanon Orange 6R Powder	519— 520	s
	966— 967	c
Cloth Fast Red GR	733— 735	w
Cross-Dye Green 2G Conc	277— 278	c
Diamine Catechine B	145— 146	c
Diamond Green 3GA	1423—1425	w
Diazanil Scarlet 6BA	7— 8	c
	497	s
Diazine Black V	199	s
	41— 42	c
	43— 44	c
Diazo Brilliant Green 3G	23— 24	c
	494	s
Diazo Brill. Scarlet 2BL Ex. Conc	1— 2	c
Diazo Fast Blue 6GW	17— 18	c
Diazo Green 3G	1400—1401	c
	1398—1399	c
Diazo Indigo Blue 4GL Ex	15— 16	c
	495	s
Diazyl Violet BL	13— 14	c
Direct Fast Black LR	75— 76	s
Direct Fast Blue SFF	73— 74	s
	187— 188	c
Erio Chrome Cyanine RC	802— 804	w
Ethonic Fast Violet 2RLN	456— 458	w
Fast Crimson R	432— 434	w
Fast Mordant Blue B	1426—1428	w
Fast Orange FSW	53— 54	s
Helindone Blue B Paste	1366—1367	c
Hydron Brown G Paste	313— 314	c
Hydron Brown G Powder	509— 510	s
Hydron Brown R Powder	820— 821	s
Hydron Sky Blue FK Paste	828— 829	s
Indanthrene Blue 8GK Paste	1358—1359	c
Indanthrene Blue Green B Dbl. Pst.	339— 340	c
Indanthrene Brown 3R Paste	301— 302	c
Indanthrene Gold Orange 3G Paste	307— 308	c
Indan. Golden Yellow GK Dbl. Pst.	1368—1369	c
Indanthrene Gray 3B Dbl. Pst	299— 300	c
	537— 538	s
Indanthrene Khaki GG Paste	1360—1361	c

Name of Dye	Dyed Sample Number	Fiber
Indanthrene Orange 3R Paste	323— 324	c
Indanthrene Pink B Dbl. Paste	331— 332	c
Indanthrene Red GG Paste	329— 330	c
Indanthrene Scarlet R Paste	1364—1365	c
Indanthrene Yellow Brown 3G Pst.	303— 304	c
	1356—1357	c
Indanthrene Yellow RK Paste	325— 326	c
Indo Carbon CL	1370—1371	c
Indocyanine B	757— 759	w
Kiton Fast Red BL	736— 738	w
Kiton Fast Red 4BL	1438—1440	w
Kromeko Yellow CGW	1408—1410	w
Kryogen Violet 3R	1498	c
Kryogen Violet 3RX	275— 276	c
Light Fast Brown 3YL	71— 72	s
	101— 102	c
Metachrome Blue Black 2BX	781— 783	w
Milling Yellow O	724— 726	w
Naphthochrome Violet R	571— 573	w
Naphthol AS and Fast Blue B Salt.	940	c
Naphthol AS & Fast Orange R Salt	941	c
Naphthol AS & Fast Red 3GL Salt.	353	c
N'thol ASBG & Fast Sc'let 2G Salt.	350	c
N'thol ASBR & Fast Sc'let 2G Salt.	343	c
Naphthol ASD & Fast Sc'let R Salt	1373	c
Naphthol ASG & Fast Sc'let 2G Salt	349	c
Naphthol ASRL & Fast Red B Salt	344	c
N'thol ASRL & Fast Red GL Salt.	351	c
N'thol ASRL & Fast Red RL Base	345— 346	c
N'thol ASRL & Fast Scarlet G Base	352	c
N'thol ASRL & Fast S'rlet 2G Salt	347	c
N'thol ASSW & Fast Bl'k LB Base	1372	c
N'thol ASSW & Fast Red KB Base	348	c
Neolan Blue 2G	751— 753	w
	1310—1312	w
Neolan Green B	1307—1309	w
Neolan Orange R	1313—1315	w
Neolan Red 3B	1322—1324	w
Neolan Yellow R	1319—1321	w
Niagara Fast Blue RL	1352—1353	c
Omega Chrome Brown R	1377—1379	w
Polar Maroon V Conc	924— 925	s
Polar Red B Conc	870— 871	s
Ponsol Gold Orange RRT Dbl. Pdr.	844— 845	s
Ponsol Gold Orange RRT Paste	976— 977	c
Ponsol Red AFF Dbl. Paste	1334—1335	c
Pontacyl Light Red BL	922— 923	s
	1441—1443	w
Pontamine Brilliant Violet B	1344—1345	c
Pontamine Copper Blue RRX	137— 138	c
	139— 140	c
Pontamine Diazo Brown R	1350—1351	c
	1348—1349	c
Pontamine Diazo Brown 6G	35— 36	c
Pontamine Diazo Orange	33— 34	c
	500	s
Pontamine Diazo Red 7BL	3— 4	c
	493	s
Pontamine Fast Black LN	47— 48	c
Pontamine Fast Blue 2GL	891— 892	s
Pontamine Fast Orange EG	271— 272	c
	475— 476	s

Name of Dye	Dyed Sample Number	Fiber
Pontamine Fast Red 8BL	852— 853	s
Pontamine Light Gray GG	1342—1343	c
Pyrogen Green GK	928— 929	c
Radio Chrome Blue B	1383—1385	w
Rosanthrene Orange R	29— 30	c
	31— 32	c
	498	s
Serichrome Green B	583— 585	w
Solantine Brown R	1354—1355	c
	1465—1466	s
Solantine Red 8BLN	1346—1347	c
Solantine Violet R	49— 50	c
	253— 254	s
Sulfanthrene Pink FF Dbl. Powder	840— 841	s
Sulfanthrene Pink FF Paste	942— 943	c
Sulfogene Brilliant Blue GG Conc.	934— 935	c
Sulfogene Cutch O	936— 937	c
Sulfogene Dark Brown GN Ex	932— 933	c
Sulfogene Indigo Blue G Conc	285— 286	c
Sulphur Olive G	281— 282	c
Sulphur Yellow 2G	291— 292	c
Supramine Yellow R	1478	sw
Toluylene Fast Orange GL	899— 900	s

TABLE 5—List of Dyeing Methods

COTTON

1. Direct, dyed with salt.
2. Same as No. 1, but diazotized and developed with beta-naphthol.
3. Same as No. 1, but diazotized and developed with developer Z, phenylmethyl pyrazolone.
4. Same as No. 1, but diazotized and developed with chloride of lime.
5. Same as No. 1, but diazotized and developed with developer H, meta-phenylenediamine.
6. Same as No. 1, but aftertreated with copper sulphate.
7. Vat, dyed with caustic soda and hydrosulphite.
8. Sulphur, dyed with sodium sulphide, soda ash and salt, and aftertreated with chrome.
9. Basic, dyed on a tannin mordant.
10. Ice colors, coupled on the fiber.
11. Aniline Black, prussiate black, not chromed.
12. Indigosol, padded and developed with nitrous acid.
13. Same as No. 7, but aftertreated with chlorine.
14. Mordant dyes.

WOOL

1. Acid, dyed with sulphuric acid and Glauber salt.
2. "Direct dyeing," dyed with sulphuric, acetic or formic acid, or ammonium acetate.
3. Substantive, dyed with Glauber salt.
4. Afterchromed.
5. Mordant dyes, on a chrome mordant.
6. Chromate dyes, dyed with chrome in the bath.
7. Indigosol, developed with nitrite.
8. Indigosol, developed with chrome.

SILK AND WEIGHTED SILK

1. Dyed with sulphuric acid.
2. Dyed with acetic acid.
3. Dyed with acetic acid and Glauber salt.
4. Dyed with soap.
5. Dyed with soap and Glauber salt.
6. Vat, dyed with caustic soda and hydrosulphite.
7. Same as No. 3, but diazotized and developed with beta-naphthol.
8. Same as No. 3, but diazotized and developed with developer Z, phenylmethyl pyrazolone.
9. Same as No. 3, but diazotized and developed with developer H, meta-phenylenediamine.
10. Same as No. 6, but oxidized with nitrite.
11. Mordant dyes, on a chrome mordant.
12. Dyed with boiled-off liquor acidified with sulphuric acid. Brightened with sulphuric acid.
13. Dyed with boiled-off liquor acidified with acetic acid. Brightened with acetic acid.

TABLE 8—Exposure Data for Sets A and B

(Exposed on clear days only between 9 a. m. and 3 p. m. at an angle of 45° from the horizontal facing south; Set A under glass, Set B without glass cover.)

Group	Date Started	Date Stopped	Temperature Deg. C.* Set A	Temperature Deg. C.* Set B	Rel. Humidity Per Cent* Set A	Rel. Humidity Per Cent* Set B	Exposure Quarter	Exposure Hours
1926 DYEINGS								
1..	6-18-26	7- 9-26	38.5	34.5	21.0	41.5	1	6
							2	12
							3	24
							4	48
2..	6-18-26	7-26-26	44.5	34.5	20.5	39.0	1	12
							2	24
							3	48
							4	96
3..	6-18-26	7-26-26	47.5	33.0	22.0	46.0	1	24
	8-26-26	10- 5-26					2	48
							3	96
							4	192
4..	6-18-26	7-26-26	44.0	32.0	25.0	45.5	1	48
	8-26-26	10- 5-26					2	96
	6-24-27	9-12-27					3	192
							4	384
5..	6-18-26	7-26-26	42.5	30.0	24.0	43.0	1	96
	8-26-26	10- 5-26					2	192
	6-24-27	10-14-27					3	384
	3- 1-28	6-28-28					4	768
1927 DYEINGS								
1..	6-29-27	7-15-27	39.0	30.5	28.0	46.0	1	6
							2	12
							3	24
							4	48
2..	6-29-27	8- 5-27	40.0	32.0	27.5	42.5	1	12
							2	24
							3	48
							4	96
3..	6-29-27	9-22-27	40.0	31.5	29.0	45.0	1	24
							2	48
							3	96
							4	192
4..	6-29-27	10-15-27	39.0	26.0	24.5	42.0	1	48
	3- 4-28	4-16-28					2	96
							3	192
							4	384
5..	6-29-27	10-15-27	40.0	25.0	23.5	40.0	1	96
	3- 4-28	8-24-28					2	192
							3	384
							4	†693

*Average of readings made at 9 a. m., 12 m. and 3 p. m. on days when samples were exposed.

†Exposure not completed.

TABLE 9—Exposure Data for Set K

(Exposed under Set A conditions, but started one year later.)

1926 DYEINGS ONLY

Group	Date Started	Date Stopped	Temperature Deg.C.*	Relative Humidity PerCent*	Exposure Quarter	Exposure Hrs.
1....	6-29-27	7-14-27	39.0	28.0	1	6
					2	12
					3	24
					4	48
2....	6-29-27	8- 5-27	40.0	27.5	1	12
					2	24
					3	48
					4	96
3....	6-29-27	9-16-27	40.0	29.0	1	24
					2	48
					3	96
					4	192
4....	6-29-27	10-15-27	39.0	26.0	1	48
	3- 1-28	4-12-28			2	96
					3	192
					4	384
5....	6-29-27	10-15-27	41.5	23.5	1	96
	3- 1-28	9-26-28			2	192
					3	384
					4	768

*Average of readings made at 9 a. m., 12 m. and 3 p. m. on days when samples were exposed.

TABLE 6—List of Chemical Types

No.	Name	Colour Index Number
1	Nitroso	1— 6
2	Nitro	7— 14
3	Azo	15— 619
4	Triphenylmethane	657— 738
5	Xanthene	739— 784
6	Acridine	785— 799
7	Quinoline	800— 811
8	Thiazole	812— 817
9	Azine	824— 869
10	Oxazine	876— 919
11	Thiazine	920— 932
12	Sulphide	933—1012
13	Anthraquinone	1027—1175
14	Indigoid	1177—1230
15	Miscellaneous, including—	
	Stilbene	620— 635
	Pyrazolone	636— 654
	Ketonamine	655— 656
	Indamine	818— 820
	Indophenol	821— 823
	Aniline Black, etc.	870— 875
	Hydroxyketone, etc.	1013—1026
17	Natural organic dyestuffs	1231—1249
18	Unknown	

TABLE 17

Time Required to Produce Approximately Equal Fading in Set A and Set F

(Only cotton samples which have faded "less" in Set F than in Set A are considered.)

Sample No.	Time required in Set A exposure to fade samples to an approximate match for Set F sample. Hours	Time exposed in Set F. Days
1	6	17
25	12	17
3, 13, 24, 26, 29, 30, 104, 111, 113, 116, 155, 276	24	17
23	36	17
1346, 1347	12	25
151, 152, 272	12	61
17, 123, 124, 129, 153, 164, 191, 274	48	61
18, 130, 163, 355	72	61
1353, 1367	144	143
159, 160	96	160
158	144	160
1361	192	347
930	192	481

TABLE 7—Distribution of the Dyes Among the Chemical and Dyeing Classes

(The number of samples in each class is given. Consult Table 5 for the dyeing methods and Table 6 for the chemical types.)

DYEING METHODS

Chemical Types	COTTON 1	2, 3, 4, 5, 6	7, 12, 13	8	9	10	11, 14	WOOL 1, 2, 3	4, 5, 6	7, 8	SILK 1, 2, 3, 4, 5, 12, 13	6, 10	7, 8, 9	WEIGHTED SILK 1, 2, 5	11	
1	..	..	..	..	..	..	..	4	..	..	..	..	..	..	..	4
2	..	..	..	..	..	..	..	3	..	..	..	..	..	..	..	3
3	104	52	2	..	7	16	..	147	98	..	169	..	11	19	..	625
4	2	..	..	..	16	..	..	36	6	..	42	..	..	5	..	107
5	..	..	..	..	4	..	..	4	..	..	11	..	..	..	..	19
6	..	..	..	..	4	..	..	..	..	..	4	..	..	..	..	8
7	..	..	..	..	..	..	..	3	..	..	2	..	..	..	..	5
8	6	4	..	..	2	..	..	3	..	..	8	..	1	..	..	24
9	..	..	..	..	4	..	..	3	..	..	8	..	..	..	..	15
10	..	..	..	36	6	..	..	..	3	..	2	..	..	..	..	47
11	..	..	..	..	7	..	..	..	3	..	..	..	..	..	..	10
12	..	..	3	..	..	..	..	..	..	..	..	4	..	..	..	7
13	..	..	97	..	..	..	1	49	27	..	18	47	..	1	..	240
14	..	..	31	..	..	..	..	7	..	12	..	25	..	..	..	75
15	4	2	..	..	4	..	1	18	3	..	12	..	..	..	..	41
17	..	..	..	..	..	..	..	..	3	..	..	..	..	..	1	4
18	..	..	..	..	..	..	..	3	6	..	6	..	..	..	..	17
Totals ...	116	58	133	36	54	16	2	280	149	12	282	76	12	25	1	1252

TABLE 10—Exposure Data for Set D

(Exposed continuously day and night behind glass, in a vertical position, facing south.)

1926 DYEINGS

Group	Date Started	Date Stopped	Temp. Deg.C. (*)	Rel. Hum. P.C. (*)	Quarter	Exposure 24-Hour Days Clear	Cloudy
1.....	7-30-26	8-13-26	38.5	45.0	1	1/3	2
					2	2	2
					3	4	2 1/3
					4	9 3/4	4 1/4
2.....	7-30-26	8-31-26	34.0	53.0	1	2	2
					2	4	2 1/3
					3	9 3/4	4 1/4
					4	16 3/4	15 1/4
3.....	8-14-26	11- 1-26	32.0	48.0	1	1 2/3	7 1/3
					2	6 1/4	11
					3	13 3/4	17 1/4
					4	35 1/4	23 3/4
4.....	8-14-26	11- 1-26	32.5	43.0	1	8 2/3	9 1/3
	6-23-27	7- 2-27			2	19	17 1/2
	7-19-27	9-16-27			3	36 1/4	37
					4	70	76 1/2
5.....	8-14-26	11- 1-26	32.0	40.0	1	22	14
	6-23-27	7- 2-27			2	44	25 3/4
	7-19-27	10-15-27			3	78	58
	3- 1-28	6-23-28			4	156 1/4	132 1/4

1927 DYEINGS

1.....	7-18-27	7-23-27	36.5	34.5	1	1	1 1/2
	7-26-27	8- 4-27			2	1 3/4	2 3/4
	8- 8-27	8-11-27			3	3 3/4	3 1/4
					4	7 1/2	10
2.....	7-18-27	7-23-27	35.5	33.0	1	1 3/4	2 3/4
	7-26-27	8- 4-27			2	3 3/4	3 1/4
	8- 8-27	8-30-27			3	7 1/2	10
					4	14 1/4	22
3.....	7-18-27	7-23-27	35.5	34.0	1	5 1/2	5
	7-26-27	8- 4-27			2	11	9
	8- 8-27	10- 4-27			3	22 1/2	14 1/2
					4	37 1/2	33 3/4
4.....	7-18-27	7-23-27	30.5	31.0	1	12 1/2	8
	7-26-27	8- 4-27			2	25 1/2	14 1/4
	8- 8-27	10-15-27			3	43 3/4	38 1/4
	3- 1-28	5-15-28			4	82 1/2	73 1/2
5.....	7-18-27	7-23-27	33.0	33.5	1	27 1/2	17 3/4
	7-26-27	8- 4-27			2	49	41 3/4
	8- 8-27	10-15-27			3	87 3/4	73 1/2
	3- 1-28	10-26-28			4	170 1/2	149

*Average of readings made at 9 a. m., 12 m. and 3 p. m. on days when samples were exposed.

TABLE 11—Exposure Data for Set E

(Exposed continuously day and night, under glass, at an angle of 45° from the horizontal, facing south.)

1926 DYEINGS

Group	Date Started	Date Stopped	Temp. Deg.C. (*)	Rel. Hum. P.C. (*)	Quarter	Exposure 24-Hour Days Clear	Cloudy
1.....	7-30-26	8- 5-26	44.5	42.5	1	1/4	1/2
					2	1/4	2
					3	1 1/2	2 1/2
					4	4 1/3	2
2.....	7-30-26	8-12-26	49.5	33.5	1	1/4	2
					2	1 1/2	2 1/2
					3	4 1/3	2
					4	9	3 3/4
3.....	8-14-26	9-14-26	41.0	41.0	1	1 1/4	7 3/4
					2	†7	†10
					3	7	10
					4	14 3/4	16
4.....	8-14-26	9-14-26	40.5	35.0	1	1 1/4	7 3/4
	10- 7-26	11-19-26			2	7	10
					3	15 1/2	20
					4	37 1/4	36 1/2
5.....	8-14-26	9-14-26	42.0	35.0	1	12 1/4	13 3/4
	10- 7-26	11-19-26			2	26 1/2	27
	6-22-27	6-29-27			3	†59 1/3	†56 1/4
	7-19-27	10-15-27			4	91	76 1/2

1927 DYEINGS

1.....	7-18-27	7-23-27	42.0	27.0	1	1/3	2/3
	7-26-27	7-27-27			2	1	1 1/2
					3	1 1/3	2 1/3
					4	3	3 3/4
2.....	7-18-27	7-23-27	41.5	28.0	1	1	1 1/2
	7-26-27	8- 4-27			2	1 1/3	2 1/3
					3	3	3 1/4
					4	6	9
3.....	7-18-27	7-23-27	40.5	28.0	1	3	3 1/3
	7-26-27	8- 4-27			2	3 3/4	4 1/4
	8- 8-27	8-27-27			3	7 3/4	8 1/2
					4	13 1/2	21
4.....	7-18-27	7-23-27	39.6	28.0	1	4 1/2	4 1/2
	7-26-27	8- 4-27			2	9 1/4	7 3/4
	8- 8-27	8-27-27			3	20 3/4	13 1/2
	9-13-27	10-20-27			4	38 1/4	33
5.....	7-18-27	7-23-27	36.0	25.5	1	11	6 1/2
	7-26-27	8- 4-27			2	24	18 1/2
	8- 8-27	8-27-27			3	44 1/4	27
	9-13-27	10-20-27			4	79	62
	3- 1-28	5-10-28					

*Average of readings made at 9 a. m., 12 m. and 3 p. m. on days when samples were exposed.

†Overexposed.

[Editor's Note: Owing to mechanical limitations, it was not possible to publish these tables in strictly numerical order.]

TABLE 12—Exposure Data for Set F

(Exposed continuously day and night in a vertical position facing north, behind glass.)

1926 DYEINGS

Group	Date Started	Date Stopped	Temp. Deg.C. (*)	Rel. Hum. P.C. (*)	Quarter	Exposure 24-Hour Days Clear	Cloudy
1.....	7-30-26	8-16-26	33.0	56.5	1	1	2
					2	2½	2¼
					3	7½	3½
					4	11⅓	5½
2.....	7-30-26	9-29-26	28.5	55.5	1	2½	2¼
					2	7½	3½
					3	12	10
					4	30⅔	30⅓
3a....	8-16-26	1- 8-27	28.0	52.0	1	5¾	10¼
	6-22-27	7- 7-27			2	15¼	17¾
					3	36¼	41¾
					4	76¼	84
3b....	8-16-26	1- 8-27	25.5	45.0	1	15½	19
	6-22-27	10-15-27			2	33¼	36½
	3- 1-28	4-16-28			3	69	80⅓
					4	156⅔	150⅓
4.....	8-16-26	1- 8-27	25.5	45.0	1	20	9¾
	6-22-27	10-15-27			2	37¾	32
	3- 1-28	4-16-28			3	69⅓	76½
					4	156⅔	150⅓
5.....	8-16-26	1- 8-27	26.0	43.0	1	36⅔	29
	6-22-27	10-15-27			2	94¼	67⅓
	3- 1-28	10- 9-28			3	141	124
					4	225	256

1927 DYEINGS

1.....	7-18-27	7-23-27	32.0	40.0	1	1¼	1¾
	7-26-27	8- 4-27			2	2	3
	8- 8-27	8-18-27			3	4½	5
					4	10¾	14
2.....	7-18-27	7-23-27	31.0	42.5	1	2	3
	7-26-27	8- 4-27			2	4½	5
	8- 8-27	9-19-27			3	10¾	14
					4	25½	30
3.....	7-18-27	7-23-27	22.0	40.0	1	8¼	4¼
	7-26-27	8- 4-27			2	17¼	8
	8- 8-27	11- 9-27			3	29¾	20
	3- 1-28	4- 6-28			4	83	60
4.....	7-18-27	7-23-27	24.0	37.0	1	19¼	12
	7-26-27	8- 4-27			2	36½	20¼
	8- 8-27	11- 9-27			3	107¼	71⅔
	3- 1-28	9-21-28			4	174	136¾
5.....	7-18-27	7-23-27	24.0	37.0	1	33½	20
	7-26-27	8- 4-27			2	99½	64¼
	8- 8-27	11- 9-27			3	154	117
	3- 1-28	10-27-28			4	194½	153

*Average of readings made at 9 a. m., 12 m. and 3 p. m. on days when samples were exposed.

TABLE 13

Time of Exposures of Set G-H (to Carbon Arc Light)

Group	Exposure Hours G SAMPLE 1st Half	G SAMPLE 2nd Half	H SAMPLE 1st Half	H SAMPLE 2nd Half
1.....	4⅔	9⅓	18⅔	37⅓
2.....	9⅓	18⅔	37⅓	74⅔
3.....	18⅔	37⅓	74⅔	149⅓
4.....	37⅓	74⅔	149⅓	298⅔
5.....	74⅔	149⅓	298⅔	597⅓

TABLE 16

Time Required to Produce Approximately Equal Fading in Set A and Set F

(Only samples which have faded "more" in Set F than in Set A considered.)

Sample No.	Time exposed in Set A. Hours	Time required in Set F exposure to fade samples to an approximate match for Set A sample Days
992, 1002, 1006, 1012, 1014, 1016, 1018, 1022, 1042	48	3
11, 12, 150, 993, 996, 998, 1015, 1023, 1026, 1030, 1036, 1040, 1043	48	4¾
128, 358, 359	48	8 (*)
10, 34, 118, 121, 122, 127, 135, 136, 149, 166, 172, 174, 185, 186, 197, 198, 357, 360, 867, 994, 995, 997, 999, 1003, 1007, 1008, 1013, 1017, 1019, 1020, 1027, 1028, 1029, 1031, 1034, 1036, 1037, 1038	48	11
864, 866, 1009	48	14 (*)
1458, 1481	48	17 (*)
939	96	4¾
310, 938, 972	96	11
1331	96	17 (*)
131, 154, 167, 292, 309, 589, 590, 591, 804, 940, 941, 954, 958, 961, 962, 963, 970, 971, 986, 987, 989	96	22
27, 168, 290, 291, 960	96	41 (*)
327, 328	192	16
320	192	33
348	192	55 (*)
28, 346, 795	192	78
1336, 1364	192	97 (*)
199, 370, 592, 610	192	149
1329, 1359, 1372	384	118 (*)
1332, 1356, 1508	384	179
1337	384	244 (*)
1330	693	164
1457	693	271
302, 317, 345, 347, 352, 957	768	265
319, 321, 322, 324, 325, 326	768	162
315, 316, 344	768	213 (*)

*Approximately.

TABLE 14—Summary of Comparisons

Comparison with Set A, which was exposed only on clear days between 9:00 a. m. and 3:00 p. m., under glass, 45° from the horizontal, facing south. The figures represent the per cent of the samples in each category.

SET	No. of Samples	Conditions	Less Faded	Slightly Less	Equal Fading	Slightly More	More Faded
Set B—All dyeings	1252	Like Set A,	1.3%	7.3%	74.0%	14.4%	3.0%
1926 dyeings 1044		but no glass	1.5	8.7	77.1	10.3	2.4
1927 dyeings 208			0.0	0.5	58.2	35.1	6.2
Set D—All dyeings	1252	Vertical	9.3	24.9	47.6	8.1	10.1
1926 dyeings 1044		South	10.7	28.5	42.3	7.4	11.1
1927 dyeings 208		Continuous	1.9	7.2	74.1	12.0	4.8
Set E—All dyeings	1252	45° South	1.8	20.7	64.2	7.1	6.2
1926 dyeings 1044		Continuous	2.2	24.4	59.8	6.5	7.1
1927 dyeings 208			0.0	1.9	86.1	10.1	1.9
Set F—All dyeings	1252	Vertical	31.8	21.0	30.0	5.8	11.4
1926 dyeings 1044		North	34.6	21.3	26.2	5.8	12.1
1927 dyeings 208		Continuous	17.8	19.2	49.5	5.8	7.7
Set G-H—All dyeings	1252	Arc lamp	4.9	8.5	59.1	15.8	11.7
Set K—All dyeings	1043	Like Set A, but another year	0.3	3.6	95.5	0.6	0.0

TABLE 15—Comparison of Set F with Set A

(Figures represent number of samples. Column headings are the same as those in Table 2.)

1926 DYEINGS

Group	Cotton L	Cotton =	Cotton M	Wool L	Wool =	Wool M	Silk L	Silk =	Silk M	Weighted Silk L	Weighted Silk =	Weighted Silk M	Total L	Total =	Total M	Grand Total
1	14 24 45 16 62			83 8 2 0 0			97 25 32 4 3			.. ..			194 57 79 20 65			
2	16 24 24 10 28			66 58 29 2 4			53 61 41 1 0			.. ..			135 143 94 13 32			
3a	3 3 21 5 6			0 0 1 1 2			0 0 5 0 0			.. ..			3 3 27 6 8			
3b	0 0 5 1 0			2 8 27 4 2			1 0 12 2 2			.. ..			3 8 44 7 4			
4	0 0 0 0 0			1 0 0 0 0			0 0 1 0 0			.. ..			1 0 1 0 0			
5	1 4 18 13 16			24 6 5 2 0			1 2 5 0 0			.. ..			26 12 28 15 16			
Total	34 55 113 45 112			176 80 64 9 8			152 88 96 7 5			.. ..			362 223 273 61 125			1044

1927 DYEINGS

1	2 2 7 1 2			4 1 9 2 0			0 4 4 0 0			0 1 11 0 3			6 8 31 3 5			
2	0 1 13 0 1			0 3 10 0 0			1 2 7 0 0			0 0 7 0 0			1 6 37 0 1			
3	2 0 8 1 2			15 8 7 1 0			0 2 1 0 0			0 1 0 0 0			17 11 16 2 2			
4	0 0 4 1 6			4 13 8 4 1			0 0 0 0 0			0 0 2 1 0			4 13 14 6 7			
5	1 0 1 1 0			8 2 3 0 1			0 0 1 0 0			0 0 0 0 0			9 2 5 1 1			
Total	5 3 33 4 11			31 27 37 7 2			1 8 13 0 0			0 2 20 1 3			37 40 103 12 16			208
Grand total	39 58 146 49 123			207 107 101 16 10			153 96 109 7 5			0 2 20 1 3			399 263 376 73 141			1252

[Editor's Note: Owing to certain mechanical limitations, it was not possible to publish the foregoing tables in strictly numerical order. The last table, No. 17, will be found on page 443.]

AMERICAN
DYESTUFF REPORTER

Devoted to the use and application of dyestuffs and the mechanical equipment incidental thereto.

LOUIS A. OLNEY
PROFESSOR OF CHEMISTRY AND DYEING, LOWELL TEXTILE SCHOOL
Directing Editor

CLAYTON HOAGLAND
Managing Editor

MYRON DREW REESER
Advertising Manager

Published biweekly by
HOWES PUBLISHING CO., INC.
90 William Street, New York City

A. P. HOWES, *President* E. S. PREDMORE, *Secretary*

Subscription price $5.00 per year; Canadian $5.50; foreign $6.00

Vol. XVIII June 24, 1929 No. 11

STRIDING TOWARD FASTNESS STANDARDS

THE Light Fastness Report that comprises most of the text in this issue may look to our readers like any other report printed merely as a matter of record in the Proceedings of the A. A. T. C. C. It differs from many previous articles on the subject, however, by reason of the tremendous amount of important work that it represents, and by reason of its unusual scientific value to textile chemistry in establishing new data on dye fastness.

To prepare the complete report itself was not a simple task, as a study of the numerous tables will at once reveal. But the real hard work lies behind the results tabulated and described. The members of the Association's Sub-Committee on Light Fastness who were entrusted with the extremely painstaking job of carrying out the exposure tests on 1,252 dyed samples are to be credited with a labor that can never be appreciated by those who read their conclusions. The entire work of determining the fastness of such a large number of dyestuffs could not have been successful, nor the results dependable, unless the tests had proceeded methodically over a long period, with every detail and every variable checked constantly and with utmost precision. It demanded an infinite capacity for taking pains.

There may be a few who will question the practical value to the textile industry of these exhaustive fading tests. A close study of the report should convince any thoughtful reader that a great stride has been taken toward the standardization of dyes with respect to their fastness to light.

MACY'S WASHABILITY PLAN

THE adoption of standard washing methods by R. H. Macy & Co., famous New York department store, should cause rejoicing in the camps of those who have been laboring on the problem of defining the fastness of dyed fabrics. It forges another link in that chain of understanding which will some day stretch from the textile mill to the housewife and enclose in its shadow the laundries and dry-cleaners, the converters and the retailers.

By establishing standards of washability Macy's will be able safely to guarantee for three grades of fastness the merchandise that it sells over the counter. All doubtful textile materials are tested in the store's laboratory and graded according to the washing methods most suitable for that class of goods. As Macy's explains in announcing the project, the benefits will be felt by the textile manufacturers and vendors as well, for standardized washability should clearly tend to eliminate unfair competition, prevent misunderstanding among the several factors involved, reduce losses due to return of damaged merchandise, and build added good-will with the public.

The rejoicing should be heard among the laundries and dry-cleaners, for these maintenance groups have repeatedly accused the manufacturers and retailers of "passing the buck" to the laundry man whenever complaints were made on garments that failed to wash well. The creation of a guarantee system based on technically accurate standards of washing and accepted by one of the largest metropolitan stores is a convincing sign that the retailers are seriously trying to clear up the fastness muddle. It is certainly to their own interest to do so. The fact that the standard methods which paved the way to such guarantees were devised by the Research Committee of the A. A. T. C. C. shows clearly that the textile chemists also, in providing the groundwork, deserve a share of the credit.

The whole incident, furthermore, is an excellent example of the ease with which the results of technical research may be applied directly to a very difficult sales problem.

SIXTY DAYS' REST FOR THE TARIFF

SODA fountains and bathing beaches may do a rushing business; vacationists may risk overheating to dash for their trains to mountain or seashore resort; a score of ocean liners carrying tourists to Europe may steam full speed head, and hours may be cut from the non-stop transatlantic flight record—but the United States Senate *will* insist on the right to move slowly.

The Senate has been scrutinizing the tariff for several weeks. Last Wednesday it suspended its extra session to adjourn for a summer recess until August 19. Before voting for the recess it defeated by a close ballot Senator Borah's resolution to confine its consideration of the tariff entirely to *agricultural* products and related schedules.

When the Senate resumes its labors in August, therefore, we may expect its members to pitch into the tariff debates with gusto. For there are to be no limits set upon the extent of their investigation; the whole tariff may be raked over thoroughly while Mr. Borah frets and fumes. If Borah's motion to concentrate upon the farm schedules had won, there might not have been any recess. But

this does not mean that Senatorial action on the tariff would have been speeded. On the other hand, a recess of two months will enable many worried captains of industry to leave on their vacations feeling confident that the tariff will sleep undisturbed during their absence. For this bit of mental relief industry will thank the slow-moving Senate.

To the American dyestuff industry the most significant part of the Senate's tariff session was the recent discussion on valuation. The testimony given by importers and other groups at the hearings on valuation held ten days ago disclosed a sentiment against the American selling price plan that our industry must reckon with. The attack on American valuation easily became an attack upon the dyestuff clauses of the tariff, paragraphs 27 and 28, as these remain the only clauses definitely based upon domestic selling price.

The chemical schedule of the tariff was put under fire on June 15. Importers traveled to Washington to testify that the domestic chemical industry has attained a development which makes unnecessary the degree of protection afforded by American valuation and what they call "high rates." Appearing before the Senate for Kuttroff, Pickhardt & Co., A. L. Mullaly declared that the duties on coal-tar products should be based on *foreign* valuation.

Now, among the worst pests is the man who says, "I told you so!" But we cannot refrain in this instance from recalling to our readers that this attack against American valuation, and specifically aimed at the coal-tar products paragraphs, was predicted in these columns several weeks ago. The hearings last week, unhappily, proved this prophecy right. An authority none other than Matthew Woll of the American Federation of Labor told the Senate that labor in this country strongly favors the American valuation plan, under which imports that compete with American goods are assessed for duty on the basis of the domestic market price of the American product. But it is also reported that Mr. Woll took the pains to be very critical of the benefits accorded by the tariff to the *dye* industry in providing American valuation as the basis for rates on competitive foreign colors, while, said Mr. Woll, other industries are denied this privilege. Here, in other words, is an important man who sponsors the very valuation plan that our industry wishes to retain, but who frowns upon its application to the dye schedules. Why? No one knows.

But, fortunately, the Senate heard also the other side of the argument on American valuation. William Burgess, of Trenton, N. J., a former member of the Tariff Commission, and John G. Lerch, who testified for the American Tariff League, both upheld American market price as the most effective valuation base.

Said Mr. Burgess: "Foreign valuation enables the foreign exporter to control the base on which *our* tariff rates are assessed, and this system has resulted in the present [Fordney-McCumber] tariff in enormous undervaluation." He then stated a number of excellent reasons why the domestic or American valuation was undeniably more scientific. But in favoring this form of value he also believed there should be an adjustment of ad valorem rates up or down, proportionate to the change in valuation.

John G. Lerch further defended the American selling price as a basis. He explained to the Senate how this works in the new tariff:

> Where it is impossible to determine the United States value of imported merchandise, and in the case of commodities covered by paragraphs 27 and 28 of Schedule 1, the American selling price is used. For six years this form of valuation has been applied to paragraphs 27 and 28 of the law of 1922, the most complex and difficult line of commodities to which it could have been applied. It has been challenged, litigated in our courts and in every particular found practical and capable of application. Unlike all forms of valuation heretofore defined in tariff acts, it defines as comparable or similar merchandise to which it applies, that which will produce substantially equal results when used in substantially the same manner.
>
> This form of valuation wherever applied will work in the same manner that experience has shown it to have worked in the coal tar dye industry, and the use of American selling price basis will automatically hold down the selling price to the consumer in the United States.

From what has been seen of the Senate's leisurely attitude toward the Hawley-Smoot tariff, we may assume that the actual passage of the bill lies far in the dim future of next fall. There will be much debating over valuation and other administrative features, and each of the schedules will come in for special hearings. To quote the New York Journal of Commerce: "The country is now in for some weeks of bitter tariff discussion and maneuvering starting in the latter part of August, and the business community may as well reconcile itself to that fact and make its preparations for an old-time scrimmage, with practically nothing in the way of methods of fighting."

The chemical schedule may be out of danger altogether so far as *rates* are concerned. Those now in the bill will probably remain to the end. But a change in valuation may throw open the whole question of protecting the domestic dye industry. Further predictions cannot safely be made.

THE FALL AND WINTER MILLINERY COLORS

A group of twenty-four colors have been selected for fall millinery wear by the Textile Color Card Association in co-operation with the Millinery Color Conference Committee. The selection has been made in accordance with the advance trend in fashionable colors for fall and winter garments, sixteen of the shades having been chosen from the 1929 Fall Woolen Card and eight from the fall season card for this year, which the Color Card Association has just sent to its members.

SILK WEIGHTING LIMITS REMAIN UNSETTLED

Despite Talk About Standards Nothing Is Yet Standardized

THE old moss-grown problem of setting limits to the amount of tin weighting most suitable for various types of silk fabrics has been solved, and solved again, but from all present indications no group in the silk industry is satisfied with the solutions offered. Since weighting is one of those technical processes which must eventually be standardized in the interests of all elements affected, it has been subjected to group action on more than one occasion, and many have been the conferences that purported to *settle*, once and for all, the proper limits for the trade to follow.

The spirit of co-operation which has manifested itself in the past few years among dyers, manufacturers and others most sorely concerned over weighting was splintered to bits when the Silk Association of America issued a new set of weighting standards on May 16. During the past five weeks these recommendations have been the subject of some heated controversy. They represent a revision of standards issued by the Silk Association last January, and this revision is nothing less than a 10 per cent increase over the previous weighting limits.

Protest from the ranks of retailers was swift and vigorous. The National Retail Dry Goods Association called a meeting at which representatives of nineteen organizations gathered to voice their dissatisfaction over the revised standards and to stress the point that the whole matter of weighting is "very much up in the air."

The retailers were not alone in their attack upon the higher limits recommended by the Silk Association. Charles Cheney, prominent silk manufacturer, issued a letter that in substance called upon all those who signed the weighting agreement in January to abide by the standards adopted at that time and to ignore the revised figures. Following this disturbing action, several conferences were called by the Silk Association and by the Retail Dry Goods Association. While the whole subject was thus thoroughly aired, very little satisfaction resulted, and the prevailing sentiment in the trade seems to be that suitable standards cannot be determined until all interested groups in the silk industry, including representatives of the retailer and the consumer, are permitted to have a voice in the formulation of such standards. It is felt that the whole question of tin-weighting silks demands thorough research before the leaders of the trade can further commit themselves.

The only action taken that might be termed definite was the announcement of R. H. Macy & Co. that it would refuse to accept any silk fabric that is weighted in excess of the original standard set by the Silk Association of America, and that it will not be a party to the 10 per cent increase recommended last month by the sub-committee and research committee on weighting of the Silk Association.

COLOR SCHOLARSHIP AWARDED AT LOWELL INSTITUTE

Miss Margaret Gray Scadding has been awarded the scholarship established by the Textile Color Card Association at the Lowell Textile Institute, according to an announcement made at the commencement exercises of that school by P. J. Wood, vice-president and general manager of the Oriental Silk Printing Company, Paterson, N. J., and a member of the board of directors of the Textile Color Card Association.

At the fourteenth annual meeting of the Textile Color Card Association, held on April 11 last at the Hotel Astor, Edward S. Johnson, president of the association, announced that the three textile and design schools which would be the first to receive the scholarships were the Lowell Textile Institute, the Philadelphia Textile School and the New York Textile High School.

"The growing importance of color in industry," Mr. Wood stated, "offers increased opportunities for our future designers and colorists, many of whom are now students in leading textile schools throughout the country.

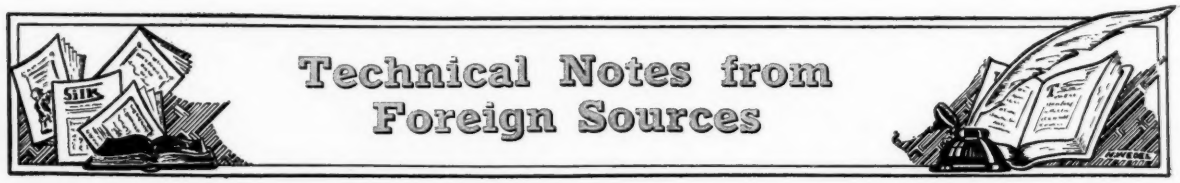
"It is the purpose of the Textile Color Card Association in creating these scholarships to develop in the student a more artistic appreciation of color, so that American industry may benefit when the student later enters commercial life.

"The students winning the scholarships have been chosen by the principal and faculty of their respective schools. The terms of the scholarships have likewise been worked out according to an individually developed plan with the principals of each school."

In the case of the Lowell Textile Institute, where the course is three years, Miss Scadding receives the award at the end of her freshman year for her high rating in color appreciation and application. Provided she maintains the high standards set by her school, her tuition will be paid by the Textile Color Card Association for the next two years. During her senior year Miss Scadding will be required to prepare a thesis on color. It is planned to have the winners of the scholarships present at the next annual meeting of the Textile Color Card Association.

POPULAR SHADES ON WOOL DISPLAYED IN NEW DYESTUFF CARD

The General Dyestuff Corporation of New York is distributing to the trade copies of a handsome new shade card entitled "Popular Shades on Wool Piece Goods." The card exhibits a range of 180 shades produced, it is explained, with level-dyeing acid colors of good fastness to light. The dyes used are shown on a separate sheet and, according to the text of the card, they were chosen because of their leveling properties and in many cases owing to their light fastness. Full recipes are given for each of the shades and a dyeing method is also included



Acid Diazo Dyestuffs for Mordant Dyeing

German Pat. No. 431,264; *I. G. Farbenindustrie A.-G.*—In an older German Patent No. 137,594 aminobenzene-azo-salicylic acids are diazotized and coupled to such compounds as 1-naphthol-4-sulphonic acid, 1-naphthol-3-6-disulphonic acid, or 2-amino-8-naphthol-6-sulphonic acid, the products as used in cotton printing yielding only brown tones of unpleasant aspect. In the present patent, 3-aminobenzene-azo-salicylic acid is diazotized and coupled to azidyl-peri-(-1-8-) amino-naphthol-sulphonic acids. The dyestuffs thus obtained are well suited for cotton printing, are of handsome red tones, and with chromium acetate give dyeings of excellent fastness to chlorine and to soaping.

Formation of Zinc Soaps

Dr. Kehren; Mell. Textil-Ber. 9, 687 (1928).—An article copiously illustrated, five figures of the effect of various soaps upon clean sheet zinc, two of characteristic zinc-soap spots upon fabrics, four of zinc pails variously fouled by the action of soaps upon the metal, a paired series, of three each, of lime, iron-lime and zinc spots upon fabrics, as they appear untreated, and as they appear after treatment with diphenylamine acetate and ferricyanide of potassium; also one last cut of a weave with numerous zinc soap-spots, after treatment with the above reagent.

The author states that zinc soaps alone are the cause of the precipitated soap spots so often troublesome. In his words, "we have already stated that when hard water is used, calcium is always detectible in the zinc soap which separates out; but the material which has separated always consists of a mixture of calcium and zinc soaps. If one uses distilled water in the soap bath, the reaction for calcium in such spots is naturally lacking at least in so far as the goods themselves contained no calcium compounds. After the abandonment of zinc or of zinc-lined vessels, we have never succeeded, even with the use of hard water, in obtaining on the goods calcium soap spots similar to the spots of zinc-soap. Certainly there formed large quantities of lime soaps in such cases, but they, as a result of their low specific gravity, separated out upon the surface of the bath, and never, in any of our experiments, settled as flakes upon the goods. If at any time some of the separated lime soap did accidentally remain sticking to the goods, i. e., when wringing out, it was easy to clean the goods by simply rinsing out again. We take the position, from the results of our experiments, that the well-known whitish flakes on washed goods originate, in every case, in the separation of zinc soaps, which in any case, according to the hardness of the water, may be mixed with more or less of lime soaps. A separation of pure lime soap (therefore when the possibility of the presence of zinc soap is excluded) has never been observed by us, even when very hard water was used."

The diphenylamine acetate and potassium ferricyanide test solution referred to above is a modification of the one recommended by Cone and Cady as a sensitive qualitative test for zinc in solution. As modified here, it is eminently suited for detection of zinc in zinc-soap spots on fabrics. It consists of a solution of 1 g. of diphenylamine in 60 to 80 c.c. of alcohol, made up to 100 c.c. with 10% acetic acid. Only so much of this acetic acid should be added that no precipitation of diphenylamine takes place. Any slight turbidity may be removed by addition of a little more alcohol. The final solution must contain a slight excess of acetic acid. The spot under examination is wetted with a few drops of this solution, and then with a few drops of a 0.5% solution of potassium ferricyanide. If zinc is present, a violet to black color is produced. The colored spot formed on goods which give the test for zinc may be quickly removed afterward by washing well with running water, then treating for a short time with 10% ammonia water, and then washing with water again. Calcium compounds do not give any color with this very delicate reagent; iron compounds might do so, but spots from this cause should be recognized previously by their yellow color.

Chemical Composition of Wool

Textil-Chem. u. Colorist 9, 112 (1928).—An exhaustive, though concise, summary of the literature in particular reference to the question of sulphur content. The review was suggested by recent work of Trotman and Bell, J. Soc. Chem. Ind. 45, 10-21 T (1926).

Contribution to Our Knowledge of Hypochlorite Bleaching

Dr. J. Auerbach; Mell. Textil-Ber. 9, 769 (1928).—The author considers the work of Muench on the formation of chloramines in the bleaching process with hypochlorite, from the albuminoid substances present in the raw cotton, to be of high value. (This paper has appeared in these columns.) He adds the following notes as supplementary to Muench's work.

Tollens was the first (Ber. 2, 189—a long time ago) to show that chloramine itself was formed by the interaction of hypochlorite and ammonia. He found that hypochlorite in the presence of ammonia would not give the aniline reaction. Since hypochlorites with aniline solution give a strong violet color, which does not disappear when am-

monia is added, the only conclusion to be drawn was that in the case cited the hypochlorite was no longer present. Tollens did some quantitative work upon the reaction between hypochlorite and ammonia. F. Raschig (1924) also carried out some work along the same line, using phenol-phthalein to follow up the disappearance of the ammonia, as the latter was gradually added to a hypochlorite solution. At the point when 1 mol. of ammonia to 1 mol. of hypochlorite was present, the phenol-phthalein remained of its characteristic red color, and the solution had lost its power of bleaching.

Beside the work of Langheld (Ber. 42, 392 and 2360) referred to by Muench, Engfeldt and Wright have published studies in the subject. Engfeldt (Zeitsch. f. Physiolog. Chem. 121, 18) studied the behavior of carbohydrates, fats, albuminous substances and their hydrolysis productions, ammonia, and some aldehydes, when treated with Dakin's solution at the room and at body temperature. His solutions contained 0.5% of NaOCl, 0.5% of Na_2CO_3, and 0.45% of $NaHCO_3$. With glucose, maltose and dextrine, oxalic acid was formed as an oxidation product. With amino acids (of particular interest in this connection), 1/150 mol. reacted completely with 100 c.c. of 1/150 N NaOCl solution. Glycocoll reacted most slowly; asparagine and phenyl-alanine reacted much more rapidly. Evidently the rate of reaction increased with increasing molecular weight. Products which could be dialyzed, and which possessed a lower molecular weight than the substance from which they were derived, were formed; and evidently desamidation took place. With sufficient excess of hypochlorite at 37° C., the degree of desamidation amounted in fifteen minutes to 56.3% and after 24 hours to 85%.

Tschilikin (Textil-Ber. 9, 397, 1928) states that phenyl-alanine, one of the substances just mentioned as studied by Engfeldt, is the chief constituent of the proteid matter present in raw cotton. He was able to identify it in the kier-boil liquor as p-phenyl-alanine.

Engfeldt recognizes the generally oxidative, degradative action of hypochlorite upon albuminous substances, but the formation of chloramines escaped his attention. His work, however, is in harmony with the results of Muench.

N. C. Wright (Biochem. Jour. 20, 254) studied the action of hypochlorite upon albuminoid substances particularly. He employed hypochlorite solution of a known value, acting upon albuminoids in definite amounts, and at definite intervals of time determined the amount of active chlorine still present. From graphs which he constructed on the basis of his determinations, he concluded that in such reactions two processes proceed side by side —oxidation and chlorination. The stability of the chlorination products of amino acids proved to be fluctuating; some were fairly, others were only slightly, stable. Their decomposition apparently involves the splitting off of hydrochloric acid.

The author presents two general conclusions:

1. The hypochlorite acts upon the albuminoids of vegetable fibers, in the bleaching process, as an oxidizing and as a chlorinating agent. In the first case, NH_3 is split off and the corresponding ketone acid formed by mild oxidation. In the second case, chloramine compounds of various stability are produced. The ammonia produced in the oxidative process reacts with hypochlorite to form mono-chloramine. Under suitable conditions this product may pass to di- or even tri-chloramine, which subsequently upon decomposition may liberate enough hydrochloric acid to damage the fabric or material considerably. To prevent this result, an aftertreatment of the goods with bisulphite is to be recommended, this reagent reducing the chloramines to ammonium chloride.

2. The bleaching action of the chloramines is practically zero. The formation of them, therefore, weakens the bleaching power of the bath.

Researches on Thickening Agents for Printing Pastes

Dr. Haller; Mell. Textil-Ber 9, 586 (1928).—A discussion of the subject from the standpoint of the chemistry of colloids; highly technical

---

SOCIETY FOR TESTING MATERIALS MEETS THIS WEEK

The thirty-second annual meeting of the American Society for Testing Materials will be held at Chalfonte-Haddon Hall, Atlantic City, N. J., from Tuesday, June 25, to Friday, June 28. The program includes a number of technical papers and special addresses and lectures, and several features of entertainment. Registration will begin June 24, and Monday afternoon and evening and Tuesday morning will be reserved for committee meetings.

Committee D-13 on Textiles will meet on Tuesday at 10 a. m. in Chalfonte-Haddon Hall. The program of this meeting will comprise a discussion of the reorganization plan of the committee, a special election of officers and consideration of the annual report.

NEW PRINTING GUM FOR VAT COLORS

A new tapioca product that acts as a thickener for vat colors and rapid fast dyes has been developed and recently placed on the market by Herrick & Voigt, of New York. It is marketed under the name of "Hevtex Gum" and is used in the proportion of 1½ pounds to the gallon of water. Described as very free-flowing in the color boxes, it is claimed that prints made with Hevtex Gum are noticeably less stiff coming from the machines and wash out easily, leaving the goods exceptionally soft. Penetration is improved, the announcement states, and extensive plant trials have shown that better color values are secured. It has been found an effective medium for printing the rapid fast colors.

NEW YORK DYESTUFF LEAGUE IN MIDST OF ACTIVE SEASON

Six Teams to Play Their Fourth Series Thursday

WITH nine games played during the month of June, members of the New York Dyestuff League are now notching their bats for three more games to be played Thursday, June 27. The teams belonging to this baseball league include the following: American Aniline Products, Inc., John Campbell & Co., The Geigy Company, General Dyestuff Corporation, A. Klipstein & Co. and Sandoz Chemical Works, Inc., all of New York City.

The games are strictly amateur contests and have been played either in Van Cortlandt Park or Central Park, New York City. H. A. Metz, president of General Dyestuff Corporation, has offered a trophy for the winning team, which will remain the property of the team that wins it three times in succession. The winning team for this season will also receive a trophy to be given by A. G. Spaulding & Bros.

As the league was formed rather late in the season, each team will play this year only one game with each of the other member teams. In future years an attempt will be made to arrange the schedule so that each team will play each of its five opponents two or possibly three times.

All those in the industry who wish to follow this series by attending any of the games scheduled may obtain further information about where the next nine games are to be played by communicating with the baseball manager of any one of the member companies. The schedule for the season follows:

JUNE 1

A. Klipstein & Company..... vs General Dyestuff Corporation
American Aniline Products.. vs John Campbell & Company
The Geigy Company ..... vs Sandoz Chemical Works

JUNE 15

American Aniline Products.. vs A. Klipstein & Company
General Dyestuff Corporation vs The Geigy Company
John Campbell & Company.. vs Sandoz Chemical Works

JUNE 22

A. Klipstein & Company..... vs John Campbell & Company
Sandoz Chemical Works .... vs General Dyestuff Corporation
The Geigy Company ..... vs American Aniline Products

JUNE 27

Sandoz Chemical Works .... vs A. Klipstein & Company
General Dyestuff Corporation vs American Aniline Products
John Campbell & Company.. vs The Geigy Company

JULY 6

A. Klipstein & Company..... vs The Geigy Company
John Campbell & Company.. vs General Dyestuff Corporation
American Aniline Products.. vs Sandoz Chemical Works

NEW INDANTHRENE BLUE ANNOUNCED

The domestic production of Indanthrene Dark Blue BOD Paste is announced in a circular recently issued by the General Dyestuff Corporation. This new Indanthrene is manufactured here by the General Aniline Works, Inc., and is described as possessing excellent fastness to light, washing and chlorine. It is stated that the new product is in an exceptionaly fine state of division, grit-free and homogeneous, and consequently of particular interest to vat-color printers.

TWO ADDED TO LEUCOSOL RANGE

The series of printing colors known as Leucosol dyes, manufactured by E. I. du Pont de Nemours & Co., has been increased by two recent additions. According to an announcement from the Dyestuffs Department of Du Pont, there has been made available a Leucosol Blue CL Paste (Patented) and Leucosol Violet RR Paste.

The Leucosol Blue CL Paste is said to differ from any printing vat blue heretofore offered and to surpass every product tested in its fastness to chlorine. It is further described as possessing extreme fastness to washing and light, and as ranking with the best of the anthraquinone vats in all other fastness properties. It is greener in shade than Leucosol Blue G Paste and, being especially prepared for the printing trade, it is stated, it is grit-free, non-foaming and extremely homogeneous, so that it does not settle out. Its uniformity, the announcement states, prevents variations in strengths of printing pastes and the formation of hard particles of dyestuff, which have a tendency to mar the rollers.

The second new color, Leucosol Violet RR Paste, is described in the circular as identical in fastness properties to the entire range of this series and similar in application to the color described above.

The rate for "Position Wanted" advertisements in this column is 2 cents a word—with a minimum of 50 cents per insertion. For all other types of advertisements—i. e., help wanted, machinery or supplies for sale—the rate is $5.00 per column inch or less per insertion.

TEXTILE SPECIALTIES

New York firm manufacturing oil specialties for textile industry wants an assistant to sales manager. Duties: Handling correspondence, salesmen's reports, sales and office details. Man with chemical engineering training and some business correspondence preferred. Apply stating experience, age, and salary required. Address: Classified Box 537, American Dyestuff Reporter.

TEXTILE CHEMIST

Young chemist, with about two years' experience in the textile industry, desired by an Eastern manufacturer of sulphonated oils, softeners, etc., for analytical and development work pertaining to the application of these products. Must have good knowledge of chemistry. Personal interview necessary. Address: Classified Box 536, American Dyestuff Reporter.

SALES EXECUTIVE

Handled complete line heavy chemicals, textile finishes fourteen years for one firm; department superintendent in large shade-cloth mills; three years president and sales-manager of active plant; general acquaintance with manufacture and application of chrome colors, paint base, bleaching, finishing and filling of muslin. Prefers chance to build up small mill, New England, with interest in business and moderate salary. Address: Classified Box 526, American Dyestuff Reporter.